Topic | METHODS OF COOKING FOOD

Reasons for cooking food:

- To kill all active and inactive pathogenic micro-organisms present in food.
- To preserve food for future use / for storage purposes.
- To destroy natural toxins they do contain.
- To aid digestion, when food is cooked it develops an attractive flavour and colour which stimulate parts of digestive system.
- To reduce the bulkiness of food e.g. where green leafy vegetables are cooked, it considerably produce, reduce and this makes it easy ton digest.
- To provide hot food in cold weather.
- To add variety in diet e.g. where meat can be fried, boiled, roasted or stewed.
- To enhance flavour of food e.g. roasted meat.
- Makes food more attractive and appetising, cooking is necessary for some process in cooking e.g. thickening of sauce, dissolving gelatine.
- Cooking is also very vital in preparation of cakes, biscuits, scorns.

The choice of the cooking method to be used is influenced by the following:

- The food to be cooked
- The amount of food preparation required
- The facilities available e.g. storage and cookings
- Equipment in place
- The need of people/ individual being catered for e.g. in terms of age, state of health, individual preference etc.
- Time available for preparation.

The method of cooking can be classified according to heat applied.
Moist method: Under this heat is applied through a medium of a liquid e.g. boiling, stewing, steaming, poaching, etc.
Dry method: Here heat is applied direct to the food e.g. baking, roasting and drilling.
Frying: Here heat is applied through the medium of fats or oils.
Micro-wave: The heat is generated by electromagnetic wave.

MOIST METHODS OF COOKING

BOILING

This is the cooking or preparing food in a liquid at a boiling point. This could be water, milk or stock. It's better to use a sauce pan with a well fitting lid to avoid evaporation.

Effects of Boiling

Gentle boiling helps to break down the tough fibrous structure of certain foods which would be less tender if cooked like other methods.
When meat is boiled for along period, the soluble meat extract are dissolved in cooking liquid.
Cooking must be slow in order to give time for the connective tissue in the tough meat to be changed into soluble gelatine, so releasing the fibres and making the meat tender.
Note: If the connective tissue gelatinises so quickly, the meat fibres all apart and meat will be tough and strings gentle cooking will ensure contraction of proteins without hardening.

Advantages of boiling

- Older, tougher, cheaper joints or meat and poultry can be made palatable and digestible.

- It's a simple method of cooking and requires little attention.
- Nutritional, well flavoured stock can be produced and this can be used in preparation of soup, sauces and gravies.
- It's suitable for large scale cooking and its economical on fuel.
- The garnish may be cooked at the same time in the same pan with the main dish e.g. carrots and green paper may be boiled with beef at ago.
- Its easy, quick and clean method foods remain juicy and moistened.

Disadvantages of boiling

- Food may break down by over boiling
- Flavour may also be lost
- Some nutrients may dissolve within the boiling liquid and if not used it results into a loss.

Note: The boiling liquid should be served as gravy, sauce / stock to avoid wastage.

STEAMING

This is cooking food in steam rising from the boiling water. The food under steaming method doesn't come into direct contact with water but it's cooked by the steam from boiling water.

It's a long slow process and steamed foods are easy to digest that is why they are suitable for invalid dishes.

Steaming can be carried out in a variety of ways:

- *The plate method:* In this method the food is placed between two plates one covering the food and crossed over boiling water which generates heat that cooks the food. This is commonly used method for steaming fish.
- *Using a steamer or direct method:* Here the food to be prepared is placed within the steamer in a particular container; whereit's cooked by steam from the boiling liquid e.g. steam pudding.
- *Using a sauce pan:* This is a way of steaming where the food is placed above the structures which are then placed at the bottom or the sauce-pan to protect food from being in direct contact with water. It's common with local foods like Matooke.

Advantages of steaming method

- The method requires little attention and from re-filling of boiling water within the sauce –pan.
- Nutrients don't dissolve / leach in the boiling liquid since there is no direct contact with food and water.
- The method makes food tender and develops a good flavour
- A variety of dishes can be cooked at ago and this helps to minimise fuel (energy conservation).
- It makes food easily digestible.
- **Note**: This method is convenient for both invalid and convalescent dishes.
- Food is unlikely to be over cooked.

Disadvantages

- There is too much loss or heat and vitamin C since the food is cooked by a long slow process.
- Food prepared by steaming method may lack colour and some times flavour.
- Steaming fills the kitchen with steam / moisture and through makes the kitchen uncomfortable place to live in, so it requires a well ventilated house.

Points to bear in mind while steaming

- Water used for steaming food must be hot throughout the working processes. One must keep boiling water aside to be used for refilling the saucepan if its about to dry up.
- Allow water to come to the boiling point before placing food to the steam and ensure that there is a steady supply / flow of steam through out the cooking process.
- When a steamer is to be used a well fitting should be placed on to prevent excessive evaporation from the boiling liquid.
- When food is ready, stand at the back when opening steamer to avoid scalding.

SIMMERING

This is the most method of cooking where by a few bubble raise on the surface and the temperatures are just below the boiling point. The simmering temperature is around 80 ^{0}C to 90 ^{0}C.

Foods are cooked in the boiling liquid and the temperatures are reduced below the boiling point to prevent food from breaking up and also to avoid toughing e.g. fish, meat, stews etc. Examples of food that are simmered may include fresh fish, fishing, nuts etc.

PARBOILING:

This is partial cooking of food with an aim of using another method to complete the cooking process e.g. chicken can be parboiled before being used in another dish where it's required.

Parboiling quickly softens the outside of the food and reduces the time needed for cooking particular foods e.g. it reduces for baking some items.

Food needs to be well drained after being parboiled using a cottander and then cooked as desired.

POACHING

This cooking of food in boiling water just below the temperature or simmering. Its a gentle slow cooking method.

The cooking liquid should just cover the food halfway the food and the heat should be applied slowly until right temperatures are reached.

It is suitable for foods containing proteins which would toughen at high temperatures e.g. eggs, fish etc.

Principles of Poaching

- The cooking liquid should be kept just below the boiling point so that there is no movement. This is because movement of the liquid can cause the food to break up
- There should be sufficient liquid to besubmerging the lid. Insufficient liquid will cause un-even cooking.

Advantages

- The application of heat is gentle, so food with delicate texture may be cooked without breaking up.
- Poached foods are easily digestible
- No foods are needed to be added to cook food. This is an advantage for people who want to reduce amount of fat in the diet.

Disadvantages

- Poaching is not particularly suitable for large pieces of food
- There is some flavour and nutrient loss from the food into the cooking liquid
- There is little development in colour and flavour.

STEWING:

It's a method of cooking in which food is cooked just below the boiling point. It usually takes long time and the temperature shouldn't rise above 90^{o}C.

It's advisable to cover the cooking pot to prevent excessive evaporation.
With stewing, the foods and the liquid in which the food is cooked are served together.
The temperature is held at simmering point for an extended period i.e. $1^1/_2$ hours.
A casserole is similar to a stew, while a stew is cooked in a pan over a hot plate, in a casserole the food is cooked while enclosed inside the oven it low heat (150 – 160^{o}C).

Principle of stewing

- Meat and vegetables are usually cut into mouth-bite pieces to allow quick and even cooking. The meat is surface sealed prior to stewing this develops the flavour of the meat and also helps to colour the source for the case of brown stews.
- While meat such as chicken and veal are blotched by soaking in cold water and brought to boil, they are then washed under cold running water prior to cooking for some white stews. This removes impurities that may discolour the source and also making it bitter.
- Seasonings and flavourings are added prior to a cooking so that they enhance flavour and taste.
- Cooking time should be larger and slow to enable tougher cuts of meat to tenderise as connective tissues are broken down.

Advantages of stewing

- It's economical as cheaper cuts of meat may be used since it tenderalises the tough cuts of meat.
- There is little loss of nutrients or moisture as any juice that escape from meat or vegetables become part of the sauce and served with meat.
- The flavour is retained in this method of cooking.
- It improves certain fruit plumbs as the cellulose is softened.
- The correct slow cooking results into very little evaporation.

Disadvantages of stewing

- Some stews lack 'bite' and contract in texture and so crisp food should be served with stew.
- It's along slow method of cooking hence requires a lot of fuel.

BRAISING

It's a combination of stewing, roasting and steaming. The food is usually a whole joint (meat or poultry) and is cooked slowly by moist heat in a tightly covered saucepan or casserole.
The meat or vegetables are first brown in fat to seal in the juices and extractives and the meat is than placed on the bed of diced vegetables (mirepoix)
Sufficient ground stoke is added to just cover the mirepoix.
The joint may be basted frequently with the stalk which is thickened and used as the sauce.

Brown braising

In brown braising, joints such as beef and venison are marinated and may be added then sealed quickly by browning on all sides in hot oven pan on the stove. Sealing the joints helps to seal the flavour, nutritive value and gives a good brown colour.
Joints are then placed on a bed of roof vegetables on a braising pan with a liquid and other flavouring covered in a led.
Joints is then placed on a roof of bread vegetables in a braising pan with a liquid and other flavouring and covered with a lid and cooked slowly in an oven.

White braising

Here the foods are balanced, refreshed cooked on a bed of broad vegetables with white stalk in a covered container in the oven.

Note: Meat for braising should be left in one piece. The bed for fried vegetables is called mire-pox.

Advantages

- A whole meal can be cooked in one pan which saves time, fuel and equipment.
- Tough cuts of meat can be made tender since it's a gentle slow cooking process.
- There is minimal loss of nutrients since the stock is served with the dish.
- The food remains juicy and palatable.
- A variety of presentation and flavour is given to the menu.

Disadvantages

- Vegetables may be over cooked due to prolonged cooking with braising.
- Meat may hot develop an attractive colour since it's cooked in a closed pan.
- Suitable foods for braising include grisket, flank which are tough. It's also a good method for the beef neck region, breast and sometimes offal's.

Safety precautions when braising

- Select suitable size pan with tight fitting lid with handles.
- Care is required when removing hot pans from the oven and when removing the lid.
- Sprin the flour on hot pans especially immediately from the oven as the warning that they are hot.

PRESSURE COOKING

A pressure cooker is a heavy gauge aluminium sauce pan which cooks food by using steam from the water or cooking liquid. The boiling point of water varies according to the air pressure i.e. the higher the pressure, the higher the boiling point.

Under normal atmospheric conditions e.g. at sea level water boils at 100^{o}C. Inside the pressure cooker the pressure is increased so that water boils at 100^{o}C.

Steam from the boiling water is driven through the food cooking it very quickly. Cooking time is reduced by about a half for every 10^{o}C that the water is raised to 100^{o}C. So the pressure cooker will reduce the cooking time to about a quarter that needed when using the steaming method.

Operation instructions

- Never operate it without prior instruction or reference to the operating manuals.
- Always check that the water level is adequate not morethan three quarters full for solids and half for liquids.
- Ensure that there is a tight seal before applying heat.
- Refer to the manuals for the cooking time because the food can be over cooked.
- Use perforated trays for vegetables so that the condensation can drain away.
- When cooking is complete, allow the pressure cooker to return to the normal atmospheric pressure before opening.

Diagram

Refer to paper 2 notes

Advantages of pressure cooker

- Its a fast method
- Energy saving since its fast
- Fewer nutrients are lost in cooking water due to little time used in cooking.
- Industrial pressure cookers are ideal for large amount of food.

Disadvantages

- Very many changes of over cooking or under cooking food
- There is greater shrinkage of meat.

DRY METHODS OF COOKING

BAKING

This is cooking of food in dry heat in a closed space. There is usually no fat except the one used baking tins, such foods that are baked include;
Flour mixtures, cake, bread, foods and vegetables, biscuits, pastries.
The food should contain sufficient fat or moisture to assist in cooking. The action of dry conversion heat is modified by steam.

Purpose of baking

- To make food more digestible, portable and safe to eat.
- To create eye appeal through colour, texture and produce on enjoyable eating quality.
- Baked food blends variety to the menu and they are popular in the diet.

Effects of baking

Chemical action caused by the action of heat on certain ingredients e.g. yeast, baking powder, changes the roast structure of many foods to an edible texture e.g. cakes, pestils however, different ingredient, methods of mixing and type of product required will cause many variations.

Principles behind baking

- The food must have a reasonable amount of moisture or fat.
- The oven must be pre-heated before baking.
- Suitable temperature must be selected for the required time.
- The oven must be closed to prevent the changes in temperature.
- For some foods, glazing might be done.
- Avoid unnecessary opening and banging of an oven door.
- Switch off of cooking is almost complete to conserve fuel by using the remaining heat.
- You can bake food that requires the same temperature together in the oven to save fuel.

Advantages

- A wide variety of sweet and savoury foods can be produced.
- Baked products give appetising eye appeal with mouth watering aroma.
- Bulk cooking can be achieved with uniformly of colour and degree of heating.
- Baking ovens have manual or automatic temperatures. So temperature can easily be controlled.
- Straight forward access for removing and rolling of items is possible or applicable.

Disadvantages

- A lot of heat is needed to pre-heat the oven which leads to wastage of energy.
- Ovens are relatively expensive even if there are there those use charcoals.
- There is a possibility of burning the products of where there are no temperature control mechanisms.
- They require much attention in their operation, so accurate timing is required.

Precautions

- Ensure accuracy in weighing / measuring and temperature control.
- Trays and must be correctly prepare i.e. by greasing and lining moulds where necessary.
- Minimise unnecessary opening of the door while baking.
- Use thick dry oven cloth for handling hot trays.
- Utilise the oven space effectively and avoid over crowding.
- Extra care needed to handle the loaded tray in and out the oven.

GRILLING

Sometimes it's called **broiling.**It's a dry method of cooking where food is cooked by radiant heat i.e. heat is transferred by means of radiation. The temperature is always high enough to seal the dish quickly thus retaining the value and flavour.
It may also be called barbecuing.

Purpose of grilling

- To make the food palatable; digestible and safe to eat.
- To utilise the speed of cooking processes, to produce distinctive flavour, colour, texture and eating quality.
- To bring a variety to the menu and to introduce into the diet simple and complicated dishes.

Methods of grilling

(a) Overhead e.g. charcoal, gas or electric heated grill.
(b) Under heat or electric salamandess (over fired grills)

Examples of foods cooked by grilling

Beef tender cuts, Lamb, Fillets, Sirlion, Liver, Spare-ribchops, kidney, Sausages, Vegetables such as mushrooms, tomatoes and mixed grills.

Principles of grilling

- Only small sized portions of food should be used. This is because large items become burnt on the outside before the inside has time to cook.
- Only fresh high quality foods should be used only prime cuts of meat and fish. This is because grilling is suited to foods which are tender and do not require moisture and long cooking to soften the texture.
- All grilled foods should be cooked when ordered and served immediately this is because grilled foods become dry, tough and cold it holds for servia for long.
- Pre-heat the grill and the grill bars and plates should be clean and some cases lightly oiled, this prevents food from sticking to the grill.
- Food should be lightly greased with oil prior to heating and turned during cooking.
- Fish should be coated with seasonal flour and brushed with oil before cooking because it has delicate flesh.
- Clean the grill immediately after cooking and remove fats from the tray.
- Meat is usually sealed or browned using high heat initially which helps to colour the food.

Advantages of grilling

- It's a quick method of cooking.
- There is little loss of nutrients.
- Foods are more easily digested since less fat is used.
- Grilled foods are usually tasty and easily digested.
- In some cases control cooking is aided because food is visible while cooked.
- Grills may be suited in the view of the customer.

Limitations

- Only good quality foods can be prepared and therefore more expensive foods can be cooked by grilling.
- Require careful attention since foods can easily get burnt.
- Grilled foods can't be successfully re-heated and are difficult to keep warm without drying and toughening i.e. need to be served straight away.

(*a*) ***Examine the importance of cooking food.***

(b) Discuss the principle underlying oven roasting

(c) Explain the effect of heat on nutrient content of food.

(d) Mention the advantages which most methods of cooking have over dry methods.

ROASTING

The aim of roasting is to *coagulate the surface of the food, seal in juice and render all tissues tender and easy to digest, safe to eat, palatable and also give a variety to the menu and diet.*

Roasting is a dry method of cooking with the aid of fat or oil in oven or on a spit C. Radiant heat is the method of heat transfer used or the means of cooking when using the spit while in oven roasting there is a combination of convention and radiation. Traditionally, roasting meant cooking using a source of radiant heat such as meat cooked on a spit or meat cooked under oven fire. Now the term is used to describe cooking food in an oven with addition of oil or fat.

Methods of roasting

Oven roasting

Under oven roasting, the circulating convected sir and radiant heat from sides of the oven are responsible for cooking the food e.g. chicken, potatoes, beefe.t.c.

However, this heat should be reduced if some foods such as fillets or beef are used since they would dry and from hard dry surface. This can sometimes be done by regulation of the temperature.

Note: Here roasting is done on an oven rack or on a bed of vegetables called mirepox

Spit roasting

It's roasting over the spit or near fire, the food is cooked by direct radiated heat as well as convected heat depending on the position of the fire. Here the food slowly rotates, this method has been of recent replaced by rottiserie and convection oven roasting.

It produces its own distinct quality colour, flavour and texture. Oven roasting is usually preferred to spit roasting because the cooking temperature is usually regulated. There is less risk of fire, juices can be retained and extractives can be used to make source and gravy.

Pot roasting

It uses cooking utensils with tight fitting lids. It's an economical method of roasting since even small less tender joints can be prepared.

It's sometimes said not to be roasting because it uses moist heat. Here the meat is cooked with a little fat over gentle heat with a lid intact. Steam is trapped under the lid of the closed utensils.

The food which is cooked with vegetables and butter just before it's fully cooked the lid is removed to allow the steam escape and dry heat to colour the food.

The juices are used to make accompaniment source. Pot roasting is suitable for poultry and game, time and temperatures depend upon the size of the joint.

Principles of oven roasting

- Only tender cuts of meat should be used.
- Meat should be at room temperature.

- Meat must be raised off the bottom of the roasting pan or tray on a spit or on the bed of vegetables or roasting pan.
- Food must be basted regularly with fat during cooking.
- Keep the meat to maintain flavour.
- Foods which have high proportion of fat require little additions of fat or oil.
- After the roast is removed from the oven, allow it to stand (roasting period) in a warm place before curving and serving. This allows the meat juices to settle there by making curving easy.
- The juices from the roast should be used to make the accompanying gravy this because the flavour from meat helps to produce a sauce or gravy of distinct flavour.

FRYING

It is a method of cooking food in hot fat or oil.
As the frying temperature is high, it is quick and suitable only for fairly thin pieces of food.
The temperature should be enough to avoid food being greasy and it should not be too high to burn the food outside before the inside is cooked.
Types of frying include,Shallow frying, dry frying,Stir fryinganddeep frying
Most foods to be fried must be coated first. This can be either in flour, batter, bread crumps to protect it from intense heat.

Foods are coated for the following reasons:

- To protect the food from extreme heat of the fat and prevent it from becoming over cooked.
- To improve on the appearance of the food thus making it more attractive.
- Preventing foods from becoming soggy after frying.
- To prevent food from breaking up.
- To prevent juices escaping from the food.
- To prevent food from drying up.

Dry frying

Here food is fried on a lightly greased hot plate or shallow pan, this method is generally used for foods which have a generally high fat content. Regulation of heat is essential to prevent the pan from over heating, the fat or oil from smoking and food from burning.
Example, foods usually dry fried;- fatty meat, Beacon, G.nuts etc.

Shallow frying

This is the basis of many different procedures such as sautéing (mainly applied to vegetables, cooking using high temperature for a short period).

Sueting and stir frying

Foods to be shallow fried are cooked in amount of fat or oil because a small amount of fat is used in relation to the food.
Skilled heat regulation and careful attention to cooking are important to prevent the food from burning or being poorly cooked.

Main uses of Sautéing

- As an alternative to shallow frying when cooking small quantities of meat and poultry. There are many foods which require an initial shallow frying of ingredients as a preliminary procedure to the main cooking operation.
- May refer to the time of cooking of food over and over while frying such as mushrooms and onions to seal it evenly in all dishes. Only small amounts of fat is used which must be pre-heated before cooking is added.

- It may also refer to meat, poultry or game which are prepared with a sauce, sautéing only part of preparation of a dish to either seal or brown meat, to reheat meat or fish, to mix and coat vegetables.

Stir frying

Is associated with Chinese cooking and here the food is kept constantly moving in a container as it cooks.

It is normally carried out in a steel work-pan which provides excellent conduction of heat through the base and sides.

Ingredients are often cooked separately and usually begin with herbs and spices such as garlic to flavour the frying medium.

Deep frying

This is the kind of frying in which food is totally immersed in the fat or oil. This ensures a rapid transfer of heat to the food. Fat that is used to fry food is pre heated to temperatures between 177^0C to 190^0C. Some fats smoke at lower temperatures than others. The smoke point depends on the nature of the fat and how it has to be used. Vegetable oils are better for deep frying than animals because their smoke points are higher.

Note: *The smoke point for a particular fat is also lowered when the exposed surface of a fat is increased; therefore use an arrow-deep-pan for frying .Avoid wider shallow pans for deep frying.*

Principles of deep frying

- Foods should be of uniform thickness and size.
- Loose crumps should be shaken free and the surface patted. And this should be done after chilling the food, this is because it chills bread crumps adhere firmly to the food and this prevents many impurities in the cooking oil.
- Very cold or frozen foods such as potatoes should be added in the cooking medium in little quantities.
- If coated in batter, any excess should be drained off to avoid contamination of the cooking oil or fat.
- Residues of crumps or batter should regularly skimmed from the frying medium.
- The frying medium should be at the correct frying point before food is added.
- The temperature of the frying medium should not exceed the frying temperature required. This is because over cooking causes detorialation of the frying medium and causes the frying medium reach its flash point.
- Foods should be dried before immersing them into the hot frying medium.
- Season the foods away from the friar. Drain the food when removing from the fat.

Safety measures to over take while deep frying

- To avoid the risk of fire, the pan should be little more than two thirds full such that the fat will not spill over. For the same reason naked flames must not leak up the sides of the pan.
- Boiling water must not be near the frying pan because drops of water splashing into the hot fat will cause it to spurt.
- All foods must be coated in batter, eggs or bread crumps unless it is starchy e.g. raw potato chips or donats.
- After using the fat it should be warmed gently until the entire bubbling stop. This is to ensure that there is no water left in it which would cause its quick decomposition. It should then be strained through a fine strainer to remove all crumps of food as bread crumps as these get churred during frying and also cause fat decomposition.

- The fat should be at the required temperature while frying is in progress this is best done by checking the thermometers while cooking.

FOODS

EGGS

STRUCTURE OF AN EGG look for a detailed structure from cooking explained.

Eggs are one of the most basic and versatile ingredient used in cookery. Eggs are prominent among the high biological value protein foods. They are cheap source of many important nutrients which include proteins, fats, vitamins and minerals.
The egg is made up of 3 main ports with an average weight between 50 – 65g.
The parts include;
Egg shell: - which is about 12% which is approximately 7g
Egg yolk: - is about 30% which is approximately 17g
Egg white: - is about 58% which is approximately 33g
Shell: It consists of the outer cuticle (a transparent protective coating), at true shell and an inner shell. Generally the shell is made up of calcium carbonate. It contains numerous tiny pores which allow in air bacteria and moisture.
The egg shell has an air space at its round end which increases as the egg becomes more stale due to a evaporation of moisture from the egg.
It is due to the fore method reason that stale eggs float.
Egg white: This consists of mainly water, some proteins minerals and water soluble vitamins dissolved in it. The jelly-like white becomes thin and runny as it becomes stale, it contains minerals such as Calcium, Phosphorous and Sulphur.
The York: This is the chief store house of nutrients for the young chick and so it's the most nourishing part of the egg. It's held in the centre of the egg white by the chalaza. If the chalaza breaks as it happens when eggs are incorrectly stored (the pointed end should point down wards) the yolk rises downwards the air space and becomes stale quickly.
Egg-yolk contains proteins of high biological value e.g. globulin and vitellin, fats which is highly emulsificated and so easily digested.
It also contains a fat-like substance called lectin which helps in nerve repair and stabilises emulsions.
Minerals like Iron, Calcium, Phosphorous and Sulphur in addition to fat soluble (A, D, E, K) are present. The colour of the egg yolk depends on the diet of the hen. Eggs don't contain any starch or sugar so should be served with carbohydrates. They also lack vitamin C, also contains vitamin of B group.

Nutritive value of the eggs

Eggs are very nutritious and good sources of animal proteins.
Proteins are 12%, Fats 11%, Minerals 3%, Vitamins 1.6%, and Water72.4%

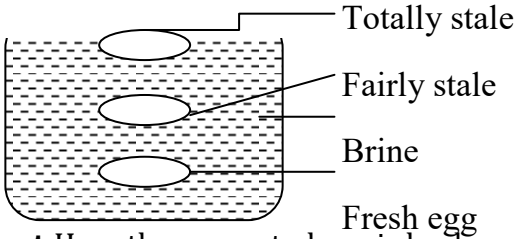
Importance of eggs in cookery

- Eggs can be used as a main dish.
- They are used for coating foods to be fried e.g. scotched eggs, fish.
- They can be used to enrich any food mixture because of their nutrient value e.g. in cakes.
- Eggs are used for thickening liquids especially sauces e.g. soups, casturds. Eggs coagulate when heated and therefore thicken the liquid into which they are mixed.

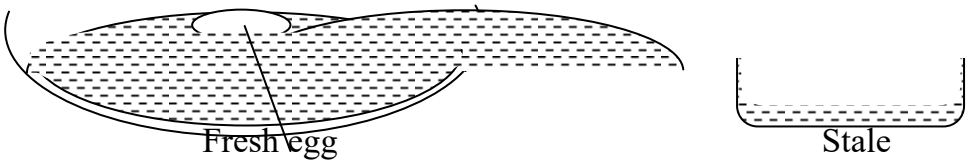
- Eggs are used for binding dry ingredients together. In the presence of heat the eggs coagulates thereby holding the foods together e.g. in fried meat balls.
- Eggs can be used for brushing over or ghizingsavoury pastries e.g. sausage rolls, Cornish pastries, meat pies and bread rolls this makes them more attractive since they attain a shiny golden colour.
- Eggs are used as leavening agent. Eggs will hold air when whisked e.g. in Swiss roll and spongy cake.
- Eggs are used as garnishes, if sliced or frailly chopped eggs can make an attractive appearance to the fish dish and even vegetable salads.
- Eggs can be used as emulsifiers, beaten eggs are capable of holding finely divided fat globules and prevent them from moving together preventing them from forming patches in the mixture, this is particularly valuable in preparation of salad cream and mayonnaise in which oil is added to a smooth emulsion with other ingredients.

Tests for the Freshness of an egg

- The eggs should feel rough in texture for a fresh egg white a stale one has a smooth texture.
- The **fresh** egg feels heavy for its size while a stale one is always light as compared to its size.
- **Brine test**, here the suspected eggs are placed in a container of salted water (brine), the fresh eggs sink to the bottom, the fairly stale ones get suspended (remain in the middle) while the stale ones float on the surface.



- **Saucer or plate test:**Here the suspected egg is broken onto the saucer, a normal egg, its yolk remains intact surrounded by the egg white, while the stale one spreads all over the saucer and there is no clear distinction between the egg yolk and the egg white.



- **Candling method:**

If the eggs are held up to the light of the candle, a normal egg appears slightly translucent while a stale one will have black spikes spread in it.

- Testing a fresh egg has pleasant smell while a stale one has an offensive unpleasant odour of hydrogen sulphide or rotten cabbages.

Storage of eggs

- Eggs should be stored when the blunt side is facing upwards for proper suspension of the egg in the center.
- Eggs should be stored away from strong smelling foods since such smells can be imported into the eggs.

- Eggs should be wiped but not washed because the washing erases away the protective layer / coating on the egg.
- Eggs should be stored in places with free circulation of air with at least 0.2% carbondioxide.

Effects of storage of eggs

- Water is lost by evaporation and this is reduced by air through the shell as a result the air space gets wider.
- Water from the egg white passes on to the yolk, this causes the yolk to get bigger which has the weakening effect on the yolk sac or vitelline membrane and makes the eggs flattened.
- The egg white may turn yellow and become cloudy.
- The egg white becomes thin due to evaporation so that when an egg is broken the egg white spreads out.
- The yolk loses its central position because of thin, egg white which can't keep it in the central position.
- There is loss of carbondioxide from the egg through the shell during storage and as a result the pH increases (becomes more alkaline).
- Bacteria may cause spoilage during storage. These enter the egg through porous shells and cause decay of the egg thus accounts for the bad odour of the egg when broken.

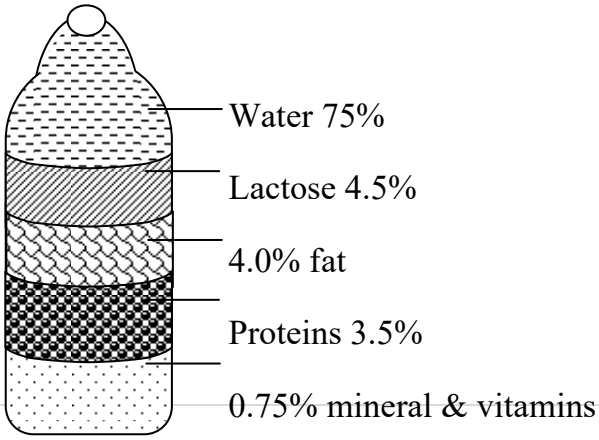
Questions

1. ***Explain how the following properties of eggs are used in cookery;***
   - ***(a) Cookery***
   - ***(b) Foaming***
   - ***(c) Emulsification***
2. ***Account for the offensive bad smell in stale eggs.***
3. ***Briefly explain the following;***
   - ***(i) Conservative cooking***
   - ***(ii) Braising***
   - ***(iii) Garnishing***
   - ***(iv) Blanching***
4. ***Explain the difference between the following;***
   - ***(i) Dry and saute frying***
   - ***(ii) Simmering and boiling***

MILK

Milk and its products are known as diary products. Milk products include butter, cheese, ghee, yoghurt, cream e.t.c

Nutritive value of milk



Proteins;Milk contains proteins of high biological value and these include caseinogens, lactolbumin, and lacto globulin.
Fats;The fats found in milk are tiny globules or droplets which raise to the surface to form a cream layer. Milk fat contains both saturated and unsaturated fatty acids in varying proportions.
Carbohydrates; Milk contains a disaccharide known as lactose which make up 4.5% of the total milk in any given volume.
Vitamins. Contains a good supply of vitamin A and the colour of cream is due to carotene.Milk as well contains vitamin D and B groups where by is a good source of vitamin B_2 and a fair supply of vitamin B_3 (niacin).
Note: Milk is a poor source of vitamin C.
Minerals: Milk is known to be a good source of calcium and a poor source of Iron. It also contains phosphorus, sodium, chlorine, potassium e.t.c
Water:A larger percentage of milk is made up of water i.e. 87% of the total milk in any given volume is water.

Effects of heat on milk

- There is loss of some vitamin B group and the remaining vitamin C.
- The proteins coagulate i.e. lactalbulin and lactoglobulin form a skin on the surface of milk when the milk boils it lifts the skin and so milk boils over.
- Heating the milk alters a little milk flavour.
- Pathogenic and souring bacteria within are destroyed.

Factors affecting quality and quantity

The variations in composition and yield of milk are caused mainly by the following;
The breed of cow / animal: Jersey cows are noted for producing milk that is of high in butter. Fat content and solids not fat. This is even true for local breeds but low milk yields.Frisians produce milk low in butter fat content and non fatty solids but high in milk yields.
The phase in the lactation period: Maximum yields are achieved in the first 4 weeks with milk of greater nutrients such as colostrums which is rich in proteins and antibodies followed by a gradual decline with time.
Type of food: To obtain milk with at least the minimum required amounts of nutrients with as high yield as possible. It is necessary for a diet of a cow to be controlled. Animals fed on concentrates produce milk with high fat content while those fed on roughages and grass produce milk of lower fat content.

Quality control (production of clean milk)

Hygiene must be observed in the farm, in transit and diary and then the kitchen. High standards and high quality are maintained in the following ways:

- Inspecting the heard (safe guarding the heard). A veterinary doctor must test all cattle to ensure that they are free from diseases. Infected cows are isolated and destroyed if necessary.
- Diary farmers should be obliged to register to the local authority and submit for inspections of their farmers periodically.
- Milkers must wash their hands and the udder before milking.
- The structure and finishing of the building must be kept as clean as possible. Flows must be connected as they can be cleaned every after use.
- After milking, the milk to be used should be cooked as quickly as possible. It's usually passed through cooking machine or stored inched.

- It's transported to the diary in the bulk tanks or chuds where it is rested whether safe and free from antibodies.
- It is then pasteurised, cooled, bottled and sealed. The can should have the number of the day of work and stamped on.
- All dairies must obtain licence from department of agriculture where they check and sample the milk products regularly.

Why milk is a perfect food

It's often called a perfect food because;

- It contains most of the essential nutrients. It contains calcium, proteins of high biological value. These are necessary for the growth and repair of body cells e.g. caseinogens, lactoalbulin, globulin and these are easily digested by the body. The fats in milk are easy to digest e.g. butane acid and oleic acid. These are suspended as very fine emulsion. It also contains lactose sugar which gives the sweetest test and necessary for heat and energy.
- Milk contains vitamins A and B such as B_1 and niacin. It contains minerals i.e. calcium and phosphorous for keeping bones and teeth strong. Milk also contains 87% water which helps the body keep healthy hence regulating body temperature.
- Milk is easily obtainable.
- It is reasonably priced though the price varies according to season of the year and grade of the milk.
- It is easily digested especially if drunk slowly it can be used as it reaches the consumer with further preparation.
- There is no wastage even if it is allowed to go bad. It can be used for cooking.
- It has a very bland flavour.

However, it can not be truthfully claimed that it has no faults as a food because;

- It contains very little vitamin B and not rich in iron.
- The vitamin C in the milk is destroyed by exposure to sunlight.
- A large percentage of bulk is water which means that it has to be drunk for its value to be realised.
- It will go bad unless kept at low temperature. If milk is kept at room temperature, the bacteria in the milk will begin to act on the milk sugar and lactose and converts it into lactic acid. The acid coagulates the chief soluble protein in milk caseinogens and cause curdling. The curds don't harm the body but their raw materials are unpleasant and distasteful to most people.
- Milk contains no roughage but their raw material is unpleasant and distasteful to most people.
- Milk contains no roughage and excursively liquid diet will eventually dislocate the digestive system particularly in intestines where undigested bulk is required to help in elimination of waste products.
- It is too soft (easily fed up).
- It lacks a bite.

Types of milk

Homogenous milk

The milk is pumped / forced through a very tinny valve so that the fat globules are broken down into smaller particles which do not rise to the surface but remain evenly distributed throughout the milk. This makes the milk cream and more digestible. The milk is then pasteurised. Homogenised milk has no cream line and the milk tends to

appear whiter in the bottle. It is claimed to be taste richer and be more digestible due to the reduction in size of the fat globules. The nutrients remain unchanged.

Pasteurised milk

It is named after respasteur which destroys disease bearing germs without altering the milk to any great change. The milk is heated to less than 72^{o}C for at least 15 seconds and then cooled rapidly to 10^{o}C or below in a heat exchanger.

All pathogenic bacteria and most of the lactic acid producing microbes which cause souring are destroyed. It is essential to cool the milk as quickly as possible in order to minimise the period during which is warm and therefore capable of breeding bacteria. This helps milk to keep longer.

It is then bottled and sealed. Pasteurised causes little alteration in the flavour although a little vitamin B_1 and C are destroyed. This is because they are water soluble and lost as vapour.

Sterilised milk

The milk is homogenised, bottled and sealed. Sterilisation is then carried out at 100^{o}C in an autoclave for about an hour. As temperatures are high, also bacteria are destroyed. The taste is altered, large amounts of vitamin C and B are destroyed and the milk becomes less digestible but it keeps for many months.

Ultra Heat Treated Milk (UHT)

This is similar to pasteurised milk but it is heated to a much higher temperature about 135^{o}C in one or two seconds and then immediately cooled and packed in sterilised polythene lined container as UHT destroys all bacteria including spores. The milk keeps for several months. It can be kept without refrigeration for about 4 months if opened but an expiry date is shown on the pack as different UHT milk have different length of shelf life. Once the pack is opened, the milk should be treated and stored.

Evaporated and condensed milk

Following pasteurisation, $^{2}/_{3}$ of water is evaporated off at low pressure. The milk is then homogenised and canned. The cans are sterilised at 11^{o}C for 20 minutes. In case of sweetened condensed milk, 15% sugar is added after pasteurisation and 60% of the liquid is then evaporated.

N.B: Neither condensed nor evaporated milk should be given to babies as the proportions of nutrients are unsuitable for them. Both have distinctive taste and can be used for various puddings and savouring dishes.

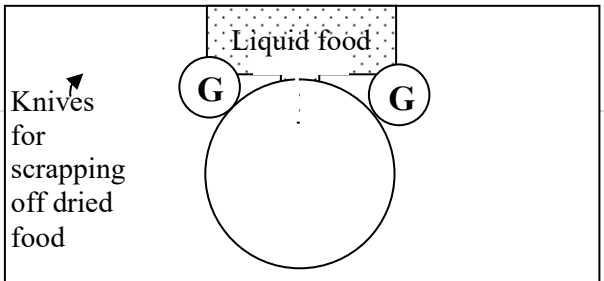
Dried / powder milk

Dried milk; milk can be preserved by drying it, this is done by removing water so that the remaining powder contains 5% or less moisture. In the process of drying milk. It is first homogenised and condensed to 60% of its moisture content. This is followed by either spray drying or roller drying.

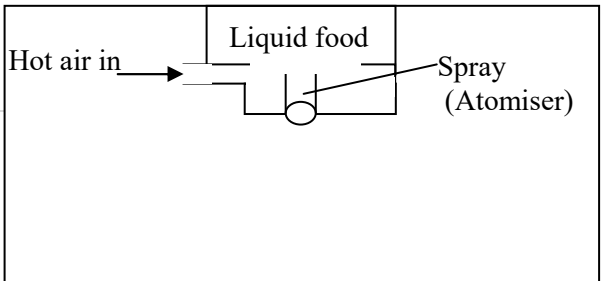
Roller dried milk is the milk which is passed over heated revolving rollers and is scrapped off as it dries. This method is used for most baby milk as higher temperatures help to sterilise it.

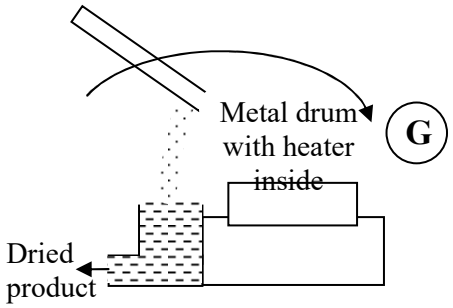
In spray drying milk is sprayed down through a hot air chamber as the droplets fall they dry and drop to the base of the chamber as powder. This milk re-constitutes easily with water (it mixes easily).

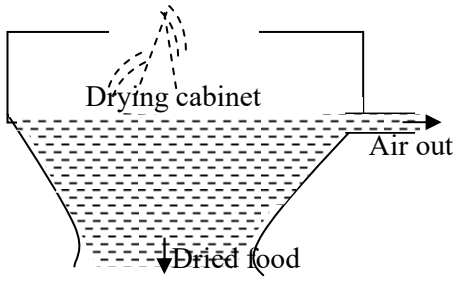
Roller drying



spray drying







Skimmed milk

When cream is removed from milk, most of the fat soluble vitamins present are skimmed off with it. The remaining milk is less creamy but contains proteins, lactose all the minerals and vitamin B group with perhaps traces of vitamin C. It has less flavour. It is ideal for low caloric and low cholesterol diet. It can be used in baking and in milk pudding. It's also used for those suffering from digestive upsets. It should not be used to feed babies and children as it is lacking vitamins A and D which are essential for growth and bone formation.

Spoilage of milk

As milk is a liquid food, it's an ideal breeding ground for bacteria. Bacteria in milk may be pathogenic lactic acid bacteria causing milk to sour or pathogenic bacteria causing many diseases such as tuberculosis or brucellos, gastroenterills and typhoid.
It is essential at every stage from cow to kitchen that utmost care is taken to prevent contamination of the milk.

Prevention

High standards of quality control and hygiene are necessary in milk production in order to prevent the spread of diseases. Legislation such as milk and diary ACTS and The Food and Drugs ACTs help to ensure both quality and hygiene by;

- Enforcing inspection of herds by veterinary doctors.
- Tuberculin testing
- Legislation of farms e.g. licensing diary farms.
- Recommended procedure for milking, storing and transporting milk.
- Pasteurisation and bottling of milk under strict control.

Souring of milk

True souring only occurs in raw milk i.e. milk that has not been heated. In unheated milk, thre is a predominantly lactic acid producing bacteria as the temperature conditions are suitable for their growth. They convert the lactose into lactic acid i.e. milk curdles.

Curdling of milk

This occurs when protein separate from the liquid part of milk it also occurs when lactic and bacteria in stale milk act on the lactose present changing into lactic acid, this makes the caseinogens to coagulate into a curd lining a liquid which is called a wley.
Curdling causes caseinogens to be separated from calcium and the insoluble caseinogens is precipitated. Milk cream goes our before the rest of the milk.

Causes of curdling of milk

- Heat as cooked milk is added to very hot coffee.
- Acids; this occurs in souring. Untreated milk sours naturally and when its lactic bacteria feed on lactose in milk producing the waste product lactic acid. This acid

causes caseinogens to coagulate into lumps of casein giving sour milk its lumpy appearance. Similar effect occurs when lemon juice is added to the milk.
- Enzymes; Rennin an enzyme in the stomach coagulates or clots caseinogens during digestion. Rennin prepared from animal rennin has the same effect during cheese making.

Culinary roles of milk
- Served as a refreshing drink when either chilled or hot.
- Served with non alcoholic beverages e.g. tea, coffee, cocoa.
- Milk is a main ingredient for some basic sauces e.g. béchamel sauce, cheese sauce, custard sauce, bread sauce.
- It is added to soups to enrich them and give good flavour.
- It is the main ingredient for milk based sweets e.g. rice pudding, junket, ice cream.
- Milk is used for making soups e.g. tomato soup, cream of chicken soup.
- Used as batters in pancakes, Yorkshire pudding.
- Glaze for brushing over the surface of scones to give a good shinny surface.

Storing of milk

As an ideal food for bacteria to breed and cause food poisoning, it is necessary to keep milk cream clean, cool and covered.
- Milk should never be left standing in the sun or at the door step. This is because it will go bad quickly and there is loss of vitamins B_2 and C due to oxidation.
- Milk from different days should not be mixed together. Put new milk in a clean jug or leave it in a bottle in which it is delivered.
- Milk should be refrigerated or kept in a cool place at a temperature of about 20^oC.
- During jug washing, they should first be rinsed in cold water as hot water will set the milk on the jug. Then wash it in hot sappy water and rinse out and wipe dry or drain.
- Do not store milk near strong smelling food such as fish as it quickly picks up the smell.
- When milk is in an open container, it must be covered to protect it from dust and fries.

Note: Milk is preserved by addition of sugar and reduction of water content.

Digestion of milk

Milk is easily digested; the protein in milk caseinogens is clotted in the stomach by rennin enzyme (in young mammals) and acted up on by enzyme pepsin in presence of HCl which converts it to peptones. The enzyme trypsin from pancreatic juice acts on peptones converting them to peptides and amino acids.
Lactase enzyme in the small intestine convert lactase within milk to its absorbable form of glucose and galactose. The enzyme lipase and the bile acts upon fats with in milk converting it to fatty acids and glycerol. At this stage the whole milk constituent are ready for absorption i.e. fats and glycerol in the lacteals of the villi.
Amino acids and glucose pass into the capillaries of the villi within the mall intestines.

MILK PRODUTS

Cheese;

It is a concentrated form of milk about 5 litres of milk yield 500g of cheese.
Cheese making is the method of preserving the nutrients of milk when in plentiful supply.

There are over 450 varieties of cheese which are known and most of them are made from creameries. In past cheese was made in household level, but due to increasing demand now cheese is produced at large scale world wide.

The composition, flavour and appearance of cheese vary according to;

- Source of milk supply
- Culture or state used
- Whether milk was whole or skimmed
- Method used in the production
- Maturing time

Types of cheese

The cheese is classified according to how they are manufactured and the ingredients used.

- Hard pressed cheese e.g. cheddar, derby, Cheshire
- Lightly pressed cheese e.g. lancrashire
- Blue veined cheese e.g. blue-stilton, wensle
- Acid curd cheese e.g. cottage cheese
- Processed cheese
- Cream cheese

How cheese is manufactured

Pasteurised fresh milk is pumped into large verts and a special bacteria is added to the milk to convert lactose to lactic acid. This cultural develops colour, flavour and texture in each type of cheese and also help to preserve cheese.

The milk is heated at $30^{o}C$ and then rennet is added to aid in the clotting of milk.

Note: In vegetarian cheese an enzyme chymocin is added instead of rennet.

The rennet is left to react for 30 – 45 minutes to form curd and whey, the curd is cut with special knifes to release the whey which is then drained off.

The curd is then slightly heated (scalded) for 40 -45 minutes with continuous stirring to eliminate the remaining whey after which the curd is cut and piled one layer on the other the process known as cheddering.

The curd is cut again and salted up to 2% for flavour and preservation.

The slated cheese is then packed into metal line / with cheese cloth and then pressed for 24 hours after which they are spared with hot water to form rind for protection.

The cheese is then removed, dated, stamped and left to ripen at $10^{o}C$ for about 4 month after which it is graded according to its flavour, texture and colour or appearance.

Nutritive value of cheese

Cheese is one of the most nutritive foods available.

- It containsconcentrated part of proteins with high biological value mainly in form of caseinogens.
- It contains fats mainly saturated fatty and this makes it a good energy giving food. The amount of fat in cheese depends upon the type of cheese i.e. chedar cheese has the highest percentage of fat which is 34.4%, cottage cheese is 3.9%
- Cheese can provide important minerals such as Ca, P, Na, Cl, Zn, is mainly large amounts in chenda cheese e.g. 500g of chenda cheese provides 300ml of calcium.
- Cheese contains large amounts of fat soluble vitamins such as A and B. Other vitamins present include Ribotlavin and niacin.

Average composition of hard cheese

Proteins 27%, Water 30%, Fat 33%, Minerals 6%, Vitamins 4%

Factors which affect / favour the digestability of cheese

Cheese is indigestible because it is highly a concentrated food with fat. So the following should be considered;

- Thorough chewing of dishes that contain cheese and cheese itself.
- Don't over cook cheese since it become tough and indigestible.
- Grate cheese properly to promote its digestion.
- Avoid eating cheese dishes towards sleeping time since this can prevent its digestion.
- Use thorough ripen cheese (old cheese which can be easily be digested).
- Spice up the dishes well to aid its digestion.

Choice of cheese

- Buy in small amounts for it can easily dry up.
- Cheese with low fat content e.g. cottage cheese
- Consider the cheese on market (satisfied cheese is safer).
- Consider the strong flavours and buy the mature variety
- Cream cheese is better for cream cakes.

Storage of cheese

- Wrap it in a loose paper in order to retain its flavour and moisture content.
- Store on a cool plate with 10 – 15^{o}C
- Grated cheese can be stored in a screw topped jar in a refrigerator.
- Soft cheese should be used within 3 – 4 days
- Remove it from a refrigerator at least an hour before use.

Effects of heat on cheese

When hard cheeses are heated, the fat first melts and the protein caseinogens continues to coagulate. Over-heating causes the protein to toughen and become stringy, reducing its digestibility. Eventually the cheese will burn.

Uses of cheese in food preparation

Cheese is used in the following ways i.e;

- As a garnish for soups, meats, cauliflour cheese.
- Its used in the preparation of sauces
- Its also in the preparation of savoury flans e.g. quichelorraine
- Its used in preparation of cakes e.g. the cheese cake.
- Cheese is very vital in the preparation of short crust pastril and scorns e.g. the cheese scorns.

Some cheese dishes;

Toasted sandwiches, cheese straws, cassava cheese, pizzas, cheese scorns
Cheese sauce e.tc

YOGHURT

This is a cultured milk product. It is made from milk which is sourced by bacteria known as lactobacillus and streptococcus thermophillus.

Traditional yoghurt is made by allowing bacteria naturally present in milk to multiply under warm conditions. The bacteria are under controlled conditions will convert lactose to lactic acid gives yoghurt a sharp acid flavour and then coagulate the proteins which eventually thicken the milk.

Types of yoghurt

There are several types of yoghurt namely;

- Natural yoghurt; this kind of yoghurt has no flavourine is added but the flavour and texture vary slightly according to the milk used.

- Fruit flavoured yoghurt; this type of yoghurt has a fruit flavour added (fruit juice or syrup), this is added before it's incubated.
- Whole / real fruits yoghurt; in this type of yoghurt a whole fruit syrup is added should stirred in after it has been incubated e.g. ice-creams, flavoured whips and different yoghurt drinks.

Composition and food value of yoghurt

Yoghurt contains all nutrients of which it's made. If dried milk is added in its preparation, it will contain extra proteins.

Yoghurt is easily digested and hence useful for young children, convulscents and elderly people.

Yoghurt is useful in the diet for;

- Energy reduced diet
- Weaning babies to solid foods
- Convalscents
- Alternatives to puddings

Uses of yoghurt in cooking

- As a substitute for double cream in cheese cakes, cold sourffles, mousses e.t.c
- Used as salad dressings as a substitute for mayonnaise
- Used in preparation of certain meat dishes e.g. goulash
- For cold drinks with fruits
- Used as a garnish or topping.

CREAM

This contains all the main components of milk but the fat content is higher and the quantity of non fat solids and water is lower.

Production at home

It is possible to make cream on a small scale in a home using unsalted butter and milk. The ingredients include;

- 150g of unsalted butter
- 115ml of milk

Method

Pour the milk the milk into a saucepan, then add the butter to the milk and put the pan over gentle heat until all the fat has melted. After it has melted, leave the mixture to cool, then pour the mixture into the jug and leave it to cool in a refrigerator.

Types of creams

The thickness of the cream depends on the amount of butter fat it contains.

- ***Single cream;*** it has butter fat content of at least 18%. It can not be wiped and used for pouring.
- ***Double cream;*** this is a rich pouring cream which is slightly homogenised and it will usually float on soup or coffee. It is wiped and contains 48% of fat.
- ***Whipping cream;*** this is an economic substitute of a double cream which can whip up to twice its original volume under the right conditions and it contains at least 35% of the fat which is the minimum necessary for whipping.
- ***Clotted milk;*** it is a thick cream with distinctive colour and flavour which is usually served on scorns or with fruits. It contains at least 55% of fat.
- ***Thinned milk;*** contains 23% of fat. It has been sterilised in the tin and will keep for several months. It can not be whipped.
- ***Ultra Heat Treated Cream;*** is heat treated to ensure long self life. Some are whipped, others not.

Uses of cream in food production

- Cream can be used as a drink especially in coffee, milk shakes and hor chocolates.
- Used in making soups and sauces.
- It can also be used as a filling for pasteuries and cakes
- Used as a salad dressing to improve on the flavour, colour and richness

Butter

Made from milk by Charning cream. It is either slated or unsalted. It has a good flavour and it is either spread on bread or used for cooking. It should be kept covered in a fridge or cool place to prevent it from going bad.

FISH

Fish is a delicious and nourishing food which can be served in many ways i.e. as horsdoevres, soup, and main courses or for snacks, salads and savouries.

1. According to fat content-this includes oily fish, white fish, shell fish:

Oily fish; these contain more than 5% fat in the fresh and are abit dark e.g. Herrings, mackerel, trout, salmon, sardines eels.

White fish; this has less than 5% of fat in their fresh and are white. They have oil in their liver, these include; Tilapia, Haddock, whiting, cod, Halibut, Lemon-soul.

Shell fish; these are categorised into two i.e. some are completely covered in a shell and others partially covered.

(i) Molluses; these have no legs or power of locomotion, some are bi-halves (2 shells) e.g. oysters, mussels, scallops others such as the periwinkles have a coiled single shell.

(ii) Crustaceans; these have legs or claws and are covered in hard skeleton. Examples include crabs, lobsters prawns, shrimps e.t.c.

2.According to the origin of fish i.e. sea fish, fresh water fish

Examples of fresh water fish include; salmon fish, pelagic, dermersal, the sea water fish is also subdivided into;

(i) Pellagic fish; is found mainly on the surface of the sea e.g. Herrings and Mackerel.

(ii) Dermersal; these swim near the bottom of the sea e.g. plaice, Haddock, Cod.

Nutritive value / content of fish

Proteins; Fish contains proteins of high biological value in slightly smaller proportions than does lean meat. White and oily fish contain roughly the same amount of proteins, shell fish has generally more proteins (10 – 15%) but as it tends to be indigestible some of these proteins may not be absorbed.

Fats; Fat is present in significant amounts in fatty fish. The fish of these group are useful sources of the physiological important long chain n – 3 (omega – 3) poly unsaturated fatty acids i.e. this is mainly obtained from only fish.

The fresh of most types of white fish contains no oil, these fish have oil stored in the liver which is removed and used to make vitamin supplements such as cod liver oil.

Carbohydrates; this is lacking in all fish. Carbohydrate food such as rice and potatoes are generally served with fish to make a balanced meal.

Vitamins; fish liver oils are the basic source of vitamins A and D. Oily fish are a good source, herrings are very high in vitamin D, providing 19.0mg/100g. All fish contains small amounts of vitamin B, vitamin C is lacking in all fish.

Minerals; Fish particularly shell fish is an excellent source of mineral elements. Calcium is found in fish in variable amounts. The highest provider of Ca and P are those in which the bones are eaten. Molluses are mainly rich in iron and zinc. Iodine and Fluorine are sea fish, Na and K are also present in fish.

Water; this varies according to fat content but is usually up to 80%.

Value of fish in the diet / dietic value of fish

- It is a major source of proteins for most people.
- It contains proteins of high biological value and is readily digested and absorbed with little waste.
- White fish is particularly most digested therefore useful food for people with digestive problems.
- Fish is a major source of essential fatty acids which are very useful to our health i.e. polyunsaturated.
- It can be cooked using different methods of cooking as stated before.
- Fish is good for invalids and convalescents cookery, young people, aged and lactating mothers.
- Elderly people must not be given fish each night; this is due to their poor sight in case of bone selection, as well as to young children.

How to choose fish / consumer choice of fish

There should be no unpleasant odour

The fish should be as fresh as possible. Ideally it should be eaten within hours of its catch.

Remember these signs of freshness

- there should be no unpleasant odour
- Fresh should be firm, the skin scaly and unbroken. The eyes bright and prominent with red gills.
- Cut fish should have a close grain and should not look watery.
- Buy fish which is in season as its the cheapest and has the most flavour.
- Buy medium sized fish. Small fish are rather tasteless and have a large proportion of bone to fresh, while large fish may be tough and stringy.
- Whole fish should be plumb.
- Smoked fish should be glossy and clean with firm flesh- not sticky.
- Buy from a reliable retailer who has a quick turn over of fish and who buys fresh supplies daily from the market.
- Make sure that the fish is not frozen over-night and then sold as fresh fish the next day.

Effects of heat on fish

The main reason for cooking fish is to bring about changes in texture, develop flavour and to destroy micro-organisms.

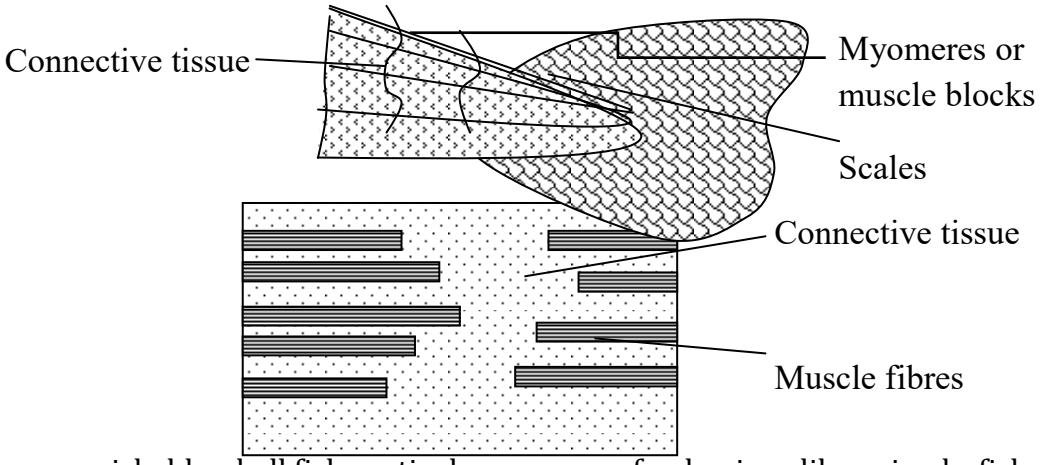
Heat has the following effects on fish;

- Protein coagulates and shrinks slightly at $60^{o}C$ to $70^{o}C$ and the fish becomes opaque.
- The connective tissue changes to gelatine, making the fish tender. Over cooking causes the fish to disintegrate.
- Bacteria and parasites such as worms and eggs are destroyed if sufficient heat is used.
- Vitamin A and D remain unchanged but there is some loss of the B-group vitamins.
- As some minerals and extractives dissolve into the cooking water, it dissolves into the cooking water, this should be used for preparation of sauces e.t.c

Structure of fish

The fresh of fish is composed of bundles of short fibres called myomeres which are held together with thin layer of connective tissue (collagen). On cooking the collagen is converted to gelatine, causing the fish to break apart very easily.

Shell fish contains coarse fibres which are difficult to digest. As many shell fish feed in polluted water, they can be a source of food poisoning. The bones of most fish contains calcium.



Fish is very perishable, shell fish particular can cause food poison like animals, fish store glycogen (animal starch) in their muscles-when fish are caught they struggle violently and use up stores of glycogen in their bodies.

As a result from above, little or no lactic acid is formed which would have a preservative effect on the fish, is not formed. This cause a rapid decay as bacteria break down the fresh into nitrogen based compounds called trimethylamine and its this which gives stale fish its characteristic unpleasant odour.

Processing of fish

Because of the perishable nature of fish, all processing must be done as soon as possible after catching. Fish may be preserved by: -smokinjg, canning, freezing.

Freezing

Fish is kept on ice for short term storage. Fish is also frozen on a large scale. Most frozen fish for retail sale is filleted, shaped or trimmed or processed into fish fingers, fish cakes and dishes such as fish in sauces. Sometimes it's coated in bread crumbs or batter e.g fish fingers.

The fish is blast frozen at very low temperature around $^{-}30^{o}C$ and then packed. Fish can be frozen and stored for up to 1 year in a domestic deep freezer. There is a slight loss of water, minerals and B-group vitamins upon thawing. Frozen fish may be a little more expensive but it's convenient to buy and store, there is no waste-the fish is already cleaned and filleted and in most cases coated and ready for cooking, so it saves time and trouble. Frozen fish is just as nutritious as fresh fish.

Canning

This is used extensively for salmon, sardines, tuna, crab herrings and many other fish are suitable for canning.

Fish may be canned in oil, salted water or brine. There is some loss of thiamine. As fish most usually canned is the oily variety canned fish is a good source of vitamin A and D and niacin or nicotine acid a vitamin B-complex that occurs in milk, liver, yeast e.t.c. The canning process softens bones, so the bone if eaten are good source of calcium.

Canned fish needs no cooking and should be added at the end of cooking time in recipes where it's used.

Smoking

Many varieties of fish may be smoked, before smoking the fish is salted to draw out the water. It's salted in dry salt or brine (strong solution of slat and water).

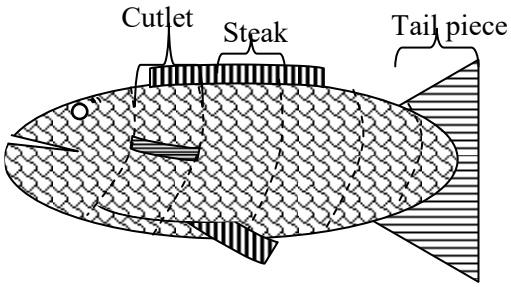
Fish may be hot smoked (110^{o}C) or cold smoked (30 ^{0}C). Hot smoked fish needs no further cooking. Smoking is carried out in ovens or kilns (large oven for burning or drying or processing something e.g. bricks).
The fish are hanged on rods and the smoke from the oak or other hard wood hipping is blown over them for approximately 4 hours. This imports a distinct smoked flavour to the fish and acids, alcohol, cresole (colourless or pale yellow liquid with a burning test and penetrating odour distilled from wood, for also used as antiseptic and formaldehyde (colourless poisonous irritating gas) in wood. Smoke has a preservative effect and repels micro-organisms. Smoking of fish is more important for its flavour that it's preservative effect.

Economic value of fish

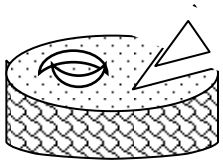
- There is up to 70% waste in fish as the head and bones are usually removed.
- The price of fish varies according to the season, type of fish and availability.
- When you buy whole fish you must allow time for the waste on cleaning, boning and skinning the fish. On the other hand you must save on fuel because fish cooks very quickly.

Cuts of fish

Fish are sold whole, gutted, filleted in cutlets or steaks

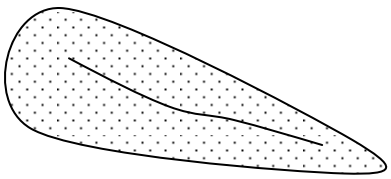


Cutlet



Steaks & cutlets are slices cut across the body of large round fish

Fillet



Fillets are long thin pieces cut from flat fish or round fish and lifted off the bone. A flat fish will have four fillets, round fish two. Fillets can be steamed, fried, grilled or baked.

Methods of cooking fish

Fish has a delicate flavour, use a moderate hear for cooking all fish and time it carefully.

Poaching

Sometimes called boiling. This is a gentle cooking in a little liquid. It's suitable for whole fish, large center cuts, thick cutlets and the tail piece.

Never boil fish. It should be simmered very gently in just enough boiling water or liquid to cover it. Always add little salt and lemon juice or vinegar to the water; these

improve the flavour and the acid keeps the flesh white. There is some loss of nutrients to the cooking liquid.

Stewing

This is fairly for fish i.e. chunks of cod, monk fish and smoked cod fish. The fish is coked gently in a well flavoured sauce e.g. white sauce, curry sauce, tomato sauce e.t.c. All the ingredients in sauce should be cooked before fish is added as it will take just ten minutes at most to cook. Two well known fish stews bouillabaisse, amediterrean dish containing selection of local fish and chowder on American shell fish stew.

Baking

Almost all fish can be baked. This method is especially suited to whole fish (which may be stuffed), fillets, cutlets and pies. If the oily fish is being used, it should be baked with a sharp flavoured sauce or stuffing to counteract the greaniness. Avoid using very large fish as the outside will be over done by the time the center is cooked. To prevent fish from drying out, brush with melted fat or cover with buttered paper or alternatively pour a little stock, wine or well seasoned sauce around it.

Frying

This method of cooking is suitable for fish fillets, cutlets, fish steaks and small whole fish. Fish can be shallow or deep fried. A coating such as egg and bread crumbs or batter is necessary when deep frying. Always dry the fish before frying and make sure that fat is at the right temperature i.e. 180^{o}C. Avoid over-crowding the pan when shallow frying and frequent turning of the fish since it can break the fish.

Drain the fish well when it's ready and serve it with lemon slices with a possible garnish.

Grilling

This is ideal for whole fish, fillets, cutlets and steaks. Heat the grill, brush fish with oil or moulted butter and remove the skin of the fillets in case it's not removed. Grill each side for 10 minutes turning only once.

N.B: Oily fish may be greasy and indigestible therefore lemon juice or sharp flavoured sauce should be served with it to help in counteracting the problem.

Storing fish

- If possible fish should be brought on the day it's to be used and not stored. All fish especially oily fish goes stale very quickly.
- If the fish is to be stored, wrap it loosely in a fresh paper and put in a refrigerator away from odour absorbing foods such as milk and butter. If one has no refrigerator, sprinkle the fish with vinegar or lemon juice and put on a plate in the coolest part of the ladder (food ladded) it should be used within 24 hours.
- Never soak fish in water or leave wrapped fish in a tight paper since this can facilitate the quickened staling.
- Quick frozen fish should be stored according to the direction on the packet.
- As the temperatures for cooking fish are relatively low, left over fish must be used up quickly.

MEAT AND MEAT PRODUCTS

Meat is defined as any part of cattle, sheep, goat, pigs, birds, horses, mules or asses, camels that is fit for human consumption. This includes both the flesh of the animal known as carcase meat and some part cut off when the carcase is being prepared known as the offals.

Carcase meat covers beef and veal from cattle, mutton and lamb from sheep, pork and bacon from pigs, poultry from all the domestic birds reared for human consumption such as chicken, ducks, turkey, geese pigeons, etc. and game meat from animals and birds that are hunted like rabbits, hares, wild ducks, deer, pheasants, etc.

Offals include kidney, liver, tongues, head, tail heart, sweet breads, tripe, feet and brains.

Note: All the types of offals are very nutritious as the flesh. Poultry and game is very similar in structure and nutrient content to that of the other types of meat.

Meat is considered one of the most important food commodity because it is an appetizing and valuable source of high biological value protein.

The cost of meat and the need to produce meat dishes which are tasty will depend upon the appropriate choice of meat cuts and the method of cooking the meat.

Therefore, knowledge is required about the construction of meat related to its choice, preparation and cooking.

Structure of meat

Detailed structure from cooking explained.

Lean meat

Lean meat is the muscle tissue of the animal. It is made up of long thin and slender nucleated cells which form the muscle fibres.

The muscle fibres are made up of proteins myosin and actin.

Each muscle fibre is surrounded by a wall of tough connective tissue composed of elastin protein. Elastin is slightly yellow in appearance and is insoluble. It is often known as gristle and also found in tendons and arteries.

The muscle fibres are held in bundles and the bundles are held together by another form of connective tissue known as collagen. The bundles of muscle fibres together make up the muscle. Collagen also surrounds the muscle and anchors it to the bone.

Fat cells (globules) are distributed within the muscle fibres. Some types of meat contain more fat cells than others e.g. pork contains a lot more fat than chicken.

Fat is also found around the organs (suet) and under the skin as adipose tissue.

Note: Good quality meat should contain visible amount of fat among the muscle fibres and this is called marbling. This keeps the meat moist during cooking.

Tenderness and Toughness of meat

Tenderness is a very important characteristic that determines the quality of meat. Tough meat is difficult to chew and swallow well as tender meat is soft, easy to chew and the flavour is easily detected.

There are several factors that affect the tenderness of meat. These include;

1. **Age of the animal**

The muscle fibres become thicker and longer as an animal grows older. The amount of connective tissue increases and therefore the meat becomes tougher. Meat from an old animal is generally tough because there is a greater amount of connective tissue, thicker and longer muscles and has more gristle. Well as meat from a younger animal has short, fine muscle fibres which have less connective tissue and little gristle.

2. Activity of the animal

The muscles of the animal which are very active like the neck, legs and shoulders muscles which carry the weight of the animal, develop longer and thicker muscle fibres with a higher proportion of connective tissue to hold the longer muscle fibres and therefore form tougher cuts of meat. However, those with little physical activity like the back and rump cuts have short muscle fibres and are therefore tender cuts or joints.

3. Hanging

After slaughter, the muscles of the animal become stiff and the flesh is very tough at this stage. This is known as Rigor Mortis. However, hanging the carcase allows the time for chemical changes in the muscles to prevent the effects of rigor mortis.

When the meat is hung;

- Muscle glycogen is gradually converted lactic acid (anaerobic respiration or glycolysis)
- Meat therefore becomes slightly acidic. The acid also acts as a preservative of the meat.
- As the acidity increases, proteolytic (protein-splitting) enzymes present in the meat act on the muscle protein causing them to soften and the flesh becomes tender.

4. The way the animal is treated before and during slaughter.

Before slaughter, it is essential that animals are rested and they should not struggle during slaughter as this will use up all the stores of glycogen present. This will make the meat tough and reduce its keeping quality.

5. The method of preparation and cooking

The choice of the appropriate method of cooking can make tough meat tender and more digestible. The use of moist heat methods of cooking like stewing is suitable for tough cuts of meat as the tough collagen tissue is softened and converted to the soluble gelatine.

This increases the tenderness of the meat. Cuts of meat with only a small amount of connective tissue can be cooked by dry heat methods like roasting, grilling or frying

Ways of tenderizing meat

There are certain procedures in meat production, processing and preparation which can be used to tenderize meat before it is cooked. These include;

- Injecting tenderizing enzymes into the live animal before slaughter. This spreads through the body via the blood stream.

- Hanging / ripening / ageing of the meat. This improves the tenderness, flavour, moisture content and keeping quality of the meat.
- Marinating the meat. Tough cuts of meat can be soaked in acidic solution e.g. vinegar, lemon or tomato juice with wine, spices and highly flavoured vegetables. The acidic environment increases the rate at which the collagen is converted to gelatine.
- Use of moist heat methods of cooking like steaming, stewing. Collagen is easily converted to soluble gelatine on application of moist heat.
- Mechanical pounding or beating with a heavy knife, meat/steak hammer or rolling pin to break down the elastin and long muscle fibres.
- Mincing or cutting meat into small pieces before cooking.
- Sprinkling of commercial meat tenderizers on the surface of the meat before it is cooked. These usually contain tenderizing chemicals or enzymes which breakdown the connective tissue proteins e.g. papain (an extract from pawpaw leaves), bromelin (from fresh pineapples), filin (from figs).
- Piecing the meat with thin knives or needles to break the meat fibres. However, this releases the meat juice, flavour and nutrients.
- Use of hydrating substances like acids, alkalis and salts to increase the water holding capacity of muscle fibre proteins.

Nutritive value of meat

Protein; Meat is rich in high biological value proteins. The main protein is myosin with some globulin and albumin. The connective tissue contains collagen and elastin proteins.

Fat; Meat contains saturated fat and the steroid cholesterol. The fat is distributed throughout the flesh or carcase of the animal, in layers between the muscle fibres, below the skin as adipose tissue and around the delicate internal organs.

The amount of fat present varies according to the age of the animal, type of meat and partly on the cut of meat e.g. chicken contains relatively little fat, liver and kidney also have little fat.

Vitamins;Meat is a good source of B group vitamins thiamine (B_1), riboflavin (B_2), niacin (B_3) and vitamin B_{12}. Liver and kidney are rich sources of vitamin A and riboflavin. Vitamin D is found in suet, dripping and some in liver but very little in the flesh.

However, all the types of meat lack vitamin C.

Minerals; Lean meat, liver, kidney and the heart provide a good supply of iron. Iron is found in the muscle pigment myoglobin and haemoglobin in red blood cells. All offals are rich in phosphorous. Meat has small amounts of sulphur and lacks calcium except in tripe.

Water; About 70% of the weight of lean meat is water. The proportion in fatty meat is less.

Carbohydrates; Meat doesn't provide carbohydrates. The carbohydrates found in the liver in form of glycogen are converted to lactic acid after slaughter.

Extractives; These are the natural flavourings present in the meat tissue which dissolve into the cooking liquid or fat and give meat its characteristic succulent or juicy flavour. They help to stimulate the flow of digestive juices, increase appetite and secretion of enzymes.

Dietetic value of meat

- Meat is especially important in the diets of infants, adolescents and all adults due to its high biological value content required at all stages of growth.
- The excellent nutritive value meat makes it suitable for all diets because it provides all the nutrients except vitamin C.
- Since meat lack carbohydrates and vitamin C, it should always be served with foods rich in these nutrients e.g. deep fried chicken plus chips and vegetable salads.
- During pregnancy and lactation, meat especially liver (offals) is useful for its high biological value protein and iron content required at these stages.
- The iron in meat (haeme iron) is easily absorbed by the body for metabolism.
- Meat contains a lot of extractives for flavour which improves appetite.
- Meat can be cooked in several ways i.e. roasted, grilled, steamed or fried. This helps to improve variety in texture and flavour in the diet

Choice of good quality meat

Meat is a highly perishable and expensive food. The important characteristics of good quality meat are its freshness, tenderness, texture, flavour and juiciness.

Although it is sometimes difficult to tell the quality of meat just by looking at it, there are several characteristics that will guide you in your choice. These include;

- Always buy meat from a clean, well ventilated and hygienic butchery with refrigerated storages.
- Buy meat from a butchery with fresh well hung meat.
- Since meat deteriorates rapidly do not buy more than you need.
- Meat should be moist but not watery or seated in a pool of blood or liquid. Meat that has been left exposed to the air for a longtime will have a dry surface.
- The amount of bone, fat or gristle should not be excessive as it will be wasted during preparation of meat.
- The colour of the meat should fit the type of meat. i.e.

- *Beef should be deep red firm flesh with visible creamy with fat,*
- *Lamb / mutton should have bright pink/brown flesh with little white fat,*
- *Veal / calf should be very pale pink/beige with little fat,*
- *Pork should be pale pink flesh with soft white fat,*
- *Poultry should have firm very pale creamy pink flesh with no visible fat,*
- *Offals should be moist, free from discolouration and unpleasant smell.*

- The flesh should be firm and elastic to the touch.
- The grains should appear fine and even.
- Choose cheaper cuts of meat which are just as nutritious as the expensive cuts and the flavour is equally good if cooked properly.
- Choose cuts of meat that are suitable for the method of cooking to be used for example tough cuts are better cooked by moist heat methods.
- Ask for bones and fatty cuts to make stock, suet and dripping
- Also consider money available, time for cooking, type of meat and number of people.

Effects of heat on meat

Several changes occur when meat is cooked that make it look attractive; develop a good flavour; appetizing; tender; digestible and safe for eating.

These changes or effects occur due to either application moist or dry heat. These include;

Dry heat

- Proteins coagulate at a temperature 40^{0} – 60^{0}c.
- Meat becomes tougher and firmer as the water is lost.
- Fat melts to produce a shiny appearance.
- Elastin contracts and the meat juices are squeezed out at 60^{0}c.
- This causes meat to shrinks and juices to escape.
- Bacteria and parasites are destroyed.
- Over-heating causes meat to become dry and hard.

Moist heat

- At 80^{0}**C** – 100^{0}C, collagen is softened and changes to soluble gelatine thereby increasing the tenderness.

- The colour of meat changes from red to brown due to conversion of myoglobin to oxymyoglobin which is cherry-brown in colour. Further heating makes meat greyish/dark brown due to formation of denatured globulin heame-chrome.
- Fat decomposes and melts away to give a crisp surface and aroma.
- Extractives are released producing an appetizing flavor and aroma.
- Water-soluble nutrients like B-group vitamins and minerals pass/dissolve into the cooking liquid.
- Bacteria and parasites are destroyed at a high temperature causing decomposition to delay.
- Meat becomes tender, digestible and safe to eat.
- Overheating causes meat fibers to separate and meat becomes stringy.

Meat Hygiene

All the types of meat are particularly susceptible to bacterial contamination. Care should be taken at every step of handling meat in order to eliminate the risk of food poisoning.

During production

- Animals should be tested for any diseases before slaughter.
- After slaughter, the carcase should be checked for infection from parasites and pathogenic bacteria.
- Strict hygiene must be observed at all stages of meat production as one infected animal can contaminated several carcases.
- All machinery, knives and surfaces should be disinfected regularly.
- Workers should keep their hands clean and wear protective clothing.
- Raw and cooked meat must never be prepared together to avoid risk of bacterial poisoning.
- The temperature should be low enough (cool) to prevent multiplication of bacteria.

At the butchery

- The shop must be clean and hygienic at all times.
- Assistants should not handle both meat and money.
- Raw and cooked meat shouldn't be sold, handled or prepared together.
- Use clean/sterile bags or containers for packing meat.
- Meat should always be kept in cool well ventilated storages.

At home

- Remove wrappings and keep meat in a covered but not airtight cool dry place e.g. directly under the ice box in a refrigerator.
- Fresh meat should be eaten within two (2) days of purchase but mince and offal should be eaten on the day of purchase.
- Meat should be removed from the refrigerator at least half an hour before cooking to bring it to room temperature. Cooked meat should also be at room temperature before it's eaten.
- Cook meat thoroughly especially pork and minced meat. This is because bacteria may reach the center of the meat during handling or processing yet normal cooking temperature may not destroy them. This means it must be cooked long enough for the heat to penetrate the center of the meat to destroy all the bacteria.
- Avoid keeping meat dishes in a warm environment where germs thrive.
- Cool leftover meat dishes quickly and keep in a refrigerator and use as soon as possible.
- Avoid cooling cooked meat in its own liquid/liquor.
- Prepare meat dishes from clean surfaces with clean equipment.
- Avoid preparing cooked and raw meat on the same surfaces to prevent recontamination.
- Store cooked meat closely covered with foil or cling film and away from fresh meat to avoid cross contamination.

For Frozen meat

- Thaw all the large joints and poultry completely before cooking. If not thoroughly thawed, the interior may not reach a sufficiently high temperature during the cooking to destroy all the pathogenic bacteria.
- Never refreeze frozen meat or poultry which has been thawed out unless it has been cooked.
- Frozen meat should be used quickly after thawing as any bacteria present before freezing will start to multiply again.

MEAL PLANNING

The rules of meal planning should include;

- Eating less salt, less fat and less sugar which causes various problems to the body if taken in excess.
- Fats and oils taken in excess cause obesity which can result in high blood pressure, goitre (painful muscles due eating property) diabetes, running out of breath, varicose veins, hypertension, arthritis (general body pains).
- Too much sugar causes one to loose the beauty owes teeth.
- Too much salt can accumulate in the body if the heart or kidney is not working properly.

- There is excessive retention of water in the body cells and this can lead to high blood pressure with the greater risks of heart attacks and strokes.
- There is more emphasis on eating more fibre which is found in vegetables, fruits and cereals like maize, millet, sorghum plus whole meal.

Things to consider when planning a meal include the following;

- The meal should be balanced with all the food nutrients needed by the body. There should be a variety of foods to ensure that the meal is balanced.
- The nutritional needs of the group. These include sex, the males tend to eat more than females. The women during their menstruation cycle need more iron than men . Age, health, ulcer carriers, diabetes, type of work.
- Variety, texture, colour and the type of spices to use.
- Avoid producing the same food in the same meal more than one time.
- Costs of the food on market.
- Season foods are usually cheaper in their season and the availability of food and familiar and weather e.g. salads in warm weather since they are served cold.
- Occasion.
- Time the meal is going to be served and time for food preparation.
- Facilities to use during food preparation.
- The skills also matter alot.
- Religious customs of the people. e.g. Muslims do not eat pork, women do not eat chicken in Buganda.

Procedures for making a menu

Most menus are planned along a single food item especially the protein e.g beef, chicken, pork e.t.c

The desert and appetiser are planned in the ratio with the course.

If the main course is light, the desert and appetiser should be heavy and vice versa;

- Decide on the main dish (protein).
- Decide on the carbohydrate accompaniment e.g. chicken stew and boiled rice.
- Decide on the vegetables specifically greens to go with the meal e.g. chicken stew, boiled rice and dodo.

Bear in mind all the guidelines given in the planning of a meal e.g. colour, texture and method of preparation.

Decide on the salad either a fruit or vegetable to be served with the meal but it is optional.

But a drink is a must.

Decide on the first course, second course.

Decide on all the courses simultaneously to avoid repetition in both tastes, colour and texture.

Food items should be grouped according to the courses and the space left between each course to demarcate the difference

Adolescent

- An adolescent is more so referred to as a teenager (13 – 19years).
- The adolescents are undergoing physical changes at puberty. This is a period of growth and development and great activity.
- Appetites are high.
- Boys wish to prove that they are energetic.
- Girls are experiencing their menstrual cycles.

Requirements

- Proteins for growth, repair and for hormone and enzyme synthesis.
- They need carbohydrates and fats. Energy requirements are usually high.
- Foods with a fairly high caloric content may be eaten.
- 30 – 35% of the energy they need can come from fats but foods with a high sugar and fat content may be limited.
- The girls tend to watch their figures and try to slim and may suffer from **Anerexia Nervosa** which damage the body and lead to death.
- Iron is needed especially for girls due to continuous loss of blood during their menstruation period (liver, meat, and eggs, green vegetables are a good source of iron).
- Vitamin C is highly needed for absorption of iron; the formation of intercellular cement and connective tissues.
- Too many fried foods, pastric and should be avoided as they lead to obesity and they cause acne.
- The teenagers need to take plenty of water, eat alot of fruits and vegetables to prevent the acne problem.

Adults

They need a well balanced meal. The work they do affect the dietary need.
However, these are subdivided into two:- sedentary and manual workers

Sedentary workers

- These are found of doing white color jobs and so are not so much bothered with the laborious work.
- Sedentary workers should check on the kilocaloric intake to avoid obesity.
- They should avoid fried foods.
- Foods with high percentage of cellulose are necessary to make sedentary worker to get satisfied for along period and therefore to discourage in between eating (snacks).
- Fruits and fruit drinks should be encouraged for snacks.
- **N.B:** These foods also prevent constipation which are common among people who are unreactive.
- Plenty of fresh air and physical exercise are highly needed to maintain their health.

Manual worker

- The meal should be balanced
- Can eat more food with a high caloric value because they use up this energy in work.
- They need about 3500kilocalories a day and therefore high energy foods are needed.
- Manual workers perspire alot and lose water and salts from the body. Provide more fluid and a little more salt can be added to their foods.
- Extra vitamin B is required to assist in the digestion and assimilation of carbohydrates.

Elderly people

- The majority elderly people need very little change to the diet they have followed throughout their adult life. A slower pace just means a #reduction in energy giving food.
- Obesity affects the health problem of old people so fat and sugar in the diet should be reduced.
- Proteins are essential for the elderly to repair the worn out tissues (Fish, milk, meat, beans, eggs).

- Badly fitting denture and difficult with digestion required soft textured food which is easy to chew and digest.
- The best methods of cooking a steaming, stewing and poached foods.
- High site may be poor therefore avoid food with bones.
- The elderly need an intake of vitamin D and calcium, this is because their bones are becoming brittle (weak) and easily break and also to prevent decalcification.
- It is good to put elderly in morning sunshine for vitamin D and fresh air.
- Anaemia can be a problem. Unexpensive cuts of meat like offals can be bought. Iron can be obtained from eggs, cereals and vegetables.
- Vitamin C is essential to prevent a mild form of scurvy. Fruits are expensive when not in season and vitamin supplements can be taken.
- The elderly find it hard to take fruits due to misconception that they are for young stars.
- Old people are usually on pension without people to take care for them. Money may be in short supply and therefore, they tend to eat meals which may not balance.
- Encourage simple and economic methods of cooking foods which are not very expensive.
- Usually old people have colonic sickness e.g. high blood pressures, diabetes, ulcers which require special diet for these people.

N.B: Doctor's instructions should be carefully followed.

Diet during illness

A person who is bed ridden is called an ***invalid.***

A person recovering from sickness is called ***convalescent.***

General rules for looking after the sick

- It is important to obey doctor's instructions.
- Be very clean in preparing, cooking and serving food to avoid food poison.
- Use fresh foods to avoid the risk of bacterial contamination.
- Cooking should be done away from the sick room to avoid the cooking smells reaching the patient to kill his / her appetite.
- Meals should be at regular times and punctual.
- The meals should appetising and easy to digest. Easy to digest methods of cooking including steaming, stewing (casserole) poaching, grilling e.g. fish
- The meal should provide variety in the types of food colour and texture to raise the appetite.
- Small helpings should be served. Several small meals are better than fewer large ones.
- Avoid fatty foods, spicy foods fried foods and too bulky carbohydrates.
- The tray should be large enough and comfortable to hold. The tray with legs is ideal.
- Dishes should be served hot and if they are meant to be cold should be chilled.
- At the end of the meal remove every traces food from the room.
- Always leave a drink by the bed covered.
- If the sick person is infectious keep their china (rockery) and cutlery and sterilising it by scalding with hot water.

Invalid

A liquid diet should be given until the temperature drops. Usually the person loses water through perspiration.

- The diet should consist of plenty of liquid foods but should not exclude solid foods.
- If possible drinks and light meals should be given alternately every two hours.

- Fruit juices should be mixed with glucose instead of sugar because it can easily be absorbed. You should also give milk drinks to the person if he / she allows.
- Various types of soups, egg flips (mixture of eggs and milk).
- The digestive system is weak therefore meals should be light and easy to digest.
- Fats should be avoided, no fired or spices.
- Very little energy is needed when lying in the bed therefore control of energy giving foods is needed.
- Plenty of proteins and micro-nutrients should be eaten to build and repair the body.
- Liquid should be supplied in form of fruit juices and foods.

Convalscent people

- Energy giving foods should also be in fewer amounts since there is no much activity.
- The patient is recovering, the diet is gradually returning to normal and therefore the person should be able to eat most foods except those with a lot of fats.

VEGETARIAN DIETS

There are three types:

Ova-lacto vegetarians; this type of diet excludes meat, fish and fowl but include eggs and milk and their products in small or moderate amounts and above all vegetables cereals and fruits.

Lacto-vegetarians; this diet includes only milk and milk products as sources of food originating from animals. The proteins in milk complement and enrich vegetable proteins so that it is not difficult to obtain the essential amino acids.

Strict vegetarians(vegan); this contains only vegetable foods omitting all animal products. It provides all the necessary nutrients including proteins.

Reasons for being vegetarian

- Religious beliefs e.g. Orthodox and Hindus are lacto vegetarian.
- Some people are vegetarian because they are allergic to animal products.
- Animal activities whereby some people object to killing of animals.
- A dislike of the flavour of animal fresh.
- The belief that the vegetarian diet is healthy.
- Poverty.

The vegan

This is a kind of person who does not take anything of animal origin but entirely depend on the things from vegetable origin.

- Make sure that they sufficient high biological proteins by eating a larger amount and wider range of low biological proteins.
- It is essential to supply each vegetable protein so as to get all the essential amino acids needed by the body 8 for adults and 10 for children e.g.
- Vitamin B_{12} is only found in foods of animal origin and it is mainly needed by children, pregnant women and nursing mothers.
- Lack of vitamin B_{12} normally causes pernicious anaemia and therefore supplements of vitamin B_{12} are needed.
- Iron from vegetable origin is poorly absorbed and one needs to eat plenty of foods and vegetables so as to absorb the required amount however, the bulk may be too much for one to handle.
- Vegans obtain their vitamin D from the sun and fortified margarines made from vegetables.

- Vitamin A comes from margarine and the carotenes in plant foods.
- Niacin is some times lacking in maize eaters but when nuts are eaten this can be overcome by turning the ***amino acid tryptophan*** into niacin:

The high in take of fibre rich foods can produce a very full feeling until the body adjusts.
Obesity is rear amongst vegetarians.
Blood cholesterol level is lower because of the large amount of fibre eaten.
Cancer of the colon is rear because of the obesity.

- Calcium can be obtained from pulses, whole cereals, nuts, fruits and vegetable but not much is available in the body because of phytic acid found in plants.

MACROBIOTIC DIET

This diet is made of 'healthy foods'. These are natural foods mainly of vegetable origin grown organically (no artificial fertilisers / pesticides).
Zero micro biotic food is the traditional food of esient Japan.
The people leaving on this diet are said to be amongst lived and healthiest people among the world.

- Refined foods, preservatives and chemicals are avoided.
- Sugar is really used and honey can be taken instead.
- Fruits and vegetables are used in season or dried naturally.
- Grain is the main food eaten e.g. millet, unpolished rice, whole wheat flour, oat meal barley.
- The diet is generally a vegetarian one although meat is not forbidden. The diet has a high content of fibre.

Low energy diet (weight reducing)

Why do we put on weight?

Obesity occurs when excess energy is taken in as food causing an increase in fat stored in the adipose tissue around the body. If the diet is restricted to energy foods, then the body has to draw on stores of adipose tissue and weight is lost.
Eating is controlled by willing power and hence obesity is a theoretically a disorder.

There are several factors that affect a person's eating habits.

- ***Sex***. The basic requirement for energy is greater in the male than the female mainly due to increased frame size.
- ***Activity.***Our energy requirement increases with more exercise and work we do.
- ***Growth.*** Babies and children require energy for growth.
- ***Age.*** As we grow older approximately 40 years of age, requirement for energy gradually diminishes as the activities decline.
- ***Customs.*** Africans tens to eat foods rich in calories due to too much activities carried out in manual tasks.
- ***Fashio.*** Fashions dictate especially to the young the weight which is desirable. Where as others are watching their figures others eat what favours their dignity.
- ***Availability of food;*** some countries and homes where food is readily available, they tend to over eat. Energy out put increases with increase in exercise. Obese people do not necessarily eat more than those who are lean but all obese people have sometime eaten more than the individual requirement.

Food has a 'thermic effect' commonly referred to as '***thermogenesis***' given off after a meal and differ from one person to another.

Diet for an obese person

- The diet must be well balanced to maintain health (do not starve).

- The diet should be taken into account taste, financial status, religious restrictions and life styles.
- The diet must produce a long termed behavioral change. The diet must be low in fats, sugar and carbohydrates.

Note: Fats should note be completely eliminated from the diet because they are a source of vitamin A and D and essential fatty acids.

- Protein in take should remain unchanged or increased slightly.
- Plenty of fruits and vegetables should be eaten. They contain few carbohydrates; they are filling and rich in vitamins, minerals and roughage.
- Eating in between meals should be avoided however, fruits and vegetables should be eaten instead.
- Avoid large in take of evening meals.
- The person dieting must have all the meals.
- Consider age, sex, activity and health conditions / status.

Foods to avoid

- All types of fats (e.g. fatty meat, cream from milk, ice cream, salad cream, mayonnaise, cooking oil, butter, cheese).
- Fried foods.
- Foods with hidden fats e.g. crisps, pope corns, chips, fried fish.
- Sugary foods e.g. sugar, glucose, syrup, honey, marmalade, jam lemon curd, chocolate, sweets e.t.c
- Starchy foods e.g. cakes, biscuits e.t.c
- Avoid thicking your soups with corn flour, but instead use egg plants, eggs.
- Avoid fruits and vegetables that have been preserved in sugar.
- Control the in take of any kind of nuts e.g. cashew nuts, ground nuts e.t.c
- Reduce on the amount of sweetened, condensed, evaporated milk.
- Sweet bottled drinks should be avoided.
- Alcohol drinks such as beer, cider, stout wines e.t.c should be avoided.

Foods allowed

- Proteins in stated quantities e.g. lean meat, (beef, mutton, pork, lamb, veal) beacon (red in colour), cheese, ham.
- Liver, kidney (trim off fat), fish, rabbits, poultry and game (any wild animal).
- Salad and vegetables e.g. lattice, chew cumber, root vegetables like spinach.
- Fruits better eaten raw.
- Salt, paper spaces of all kinds herbs.
- Beverages, tea, milk should be skimmed.
- Beef extract e.g. roycomuchuse mix.
- Soda, water, lemon juice.

Complication of obesity

Obesity results into the following;

- Hypertension
- Stroke
- Heart attack
- Arthritis – painful muscles
- Varicose around the legs (swollen vessels
- Shortness of breath
- Diabetes

- Gall stones
- Depletion
- Goitre - alot of pain every where.
- Premature death
- General chest diseases
- In addition basic hygiene may be difficult.

Low salt diet (nacl)

Salt is a mineral consisting of two elements Na^+ and Cl^- ions. In a low salt diet, it is sodium which must be restricted. All foods contain some sodium as it is found in fluids surrounding the cells.

Under normal circumstances, any excess sodium eaten is excreted by the kidney in the urine. The sodium content of foods or of the diet is expreseed in milligrams or millimoles.

Uses of a low salt diet

- It is good for people with high blood pressure.
- Oedema which is expressed / shown by fluid retention in the tissues which causes swelling. Oedema is also present in the following protein – calorinemul-nutrition disease, kidney, heart problem and liver problem.

Dietary sources of salt

- Salts used in cooking or at the table
- Salts used in preservative e.g. in beacon, packeted soups, salt biscuits.
- Salt used as flavouring e.g. in pop corns
- Salts used in a raising e.g. sodium bicarbonate
- Salt used as a flavour enhancer
- Sodium used as sweatier e.g. saccharine

How to reduce on salt

- Low added salt on table
- Use minimum amount of salt
- Avoid eating salted dishes where it is preservative
- Avoid eating too much salt

GASTRIC DIETS

Gastric diets are used in treatment of gastric (stomach) and duodenal ulcers.

Ulcers

This is a low area in the lining of the gastric tract usually in the stomach and therefore are called gastric ulcers or the duodenum which called duodenal ulcers.

They are caused by the attraction of pepsin on an inflamed section of the stomach and results in discomfort and pain.

Causes

- ***Stress*;** This causes loss of appetite
- ***Hard work***; Too busy people may reserve no time to eat and end up suff.
- ***Erratic diet*;** Missing on meals is yet another cause of ulcers. This is common in Bachelors and spinsters.

The person has to learn to deal with stress and worry and also leaving alone in the house alone

Symptoms

Pain (preceded by hunger) in the stomach in the chest and the back. With the duodenal ulcers some times pain comes after eating food and the person may feel nauseated.

Ulcers tend to run in families and it is common in blood group A and B.

Aim of the diet

- To relieve pain.
- To assist healing.
- To maintain good nutrition.
- To neutralise the acid.

How to treat ulcers

- Take frequent small meals every 2-3 hours so that the stomach never becomes empty.
- Eat under relaxed conditions and chew your food thoroughly.
- Milk and milky foods help to neutralise the stomach acids and should be taken in fairly good amounts especially if a meal has to be missed.
- Avoid the foods to cause discomfort and these include acidic foods e.g. pineapples, oranges, etc.
- Spiced and pickles, rich foods (foods with a lot of fats) e.g. pastries, foods with tough skins, vegetable with hard cuticle.
- Avoid alcohol and smoking.
- Avoid cooked cheese and strong cheese.
- Avoid fizzy drinks such as gaseous sodas.

Recommended food

- A daily supply of milk to the sick.
- Mild cheese
- Cottage cheese
- Any lean meat
- White fish
- Cream cheese
- **NB**: Methods of cooking may be considered a lot and these include steaming, stewing, boiling.
- Mashed potatoes are also good
- Soft fresh fruits

Gastrol enteritis

This is a general fiancé for various forms of food poisoning and infections of the gastro intestinal tracts.

Symptoms

- Nausea
- Vomiting
- Severe abdominal crumps
- Diarrhoea

Recommended foods

Take liquids only for 12-14 hours. eg glucose, drinks, water, carbonated drink, skimmed milk, ORS and gradually include easy to digest foods e.g. poached eggs, steamed white fish, milk puddings etc.

Note: If you cannot get ORS you can make yours by adding salt, sugar and water.

Gluten free diet

Gluten is the protein found in cereals e.g. lye, barley and oats.

Gluten free diets are used in the treatment of patients with gluten sensitivity.

Coeliac disease

Coeliac disease most frequently appers in early child hood although it may also show up in adulthood.

It most often starts at the time a child is weaned into wheat containing foods.
It is caused by the effect of gluten on the villi of the small intestines. The villi become damaged and abnormal and are no longer able to absorb nutrients properly resulting into a less weight and failure to benefit from many of the nutrients required by the body.

Symptoms

- Fatty diarrhoea caused by poor absorption
- Failure to gain weight
- Distended abdomen
- Under nourished
- Anaemic
- Apathy and irritability

Treatment

Treatment by gluten free diet and always lasts for the whole of life.
It is essential to exclude all gluten from the diet as even small amounts may causing ill effects.
All wheat, rye, barley and oats must be extruded along with foods made or containing alcohol made with them.
NB: In countries where is gluten flour used to make the above foods, it is essential for the protein to be given in good amounts to ensure a good protein intake. Cereals like maize, cornflakes, soya can be given instead of the water beets.

ANOREXIA NERVOSA

A few people especially adolescent girls suffer from anorexia nervosa. This is caused by excessive slimming or an eating disorder. It may originate from emotional unhappiness e.g. grief, fear of growing up, instability in relationship in family and friends.
These people will take in calories and induce vomiting in order to avoid putting on weight.

Symptoms

- Drastic weight loss.
- Thin and emaciated body
- May lose menstruation
- Loss of sensitivity to cold
- May finally result in death if not treated.

Treatment

- The people of such kind should be counselled on what is causing the problem.
- They may need special kind of treatment in hospital
- A diet usually involves a high carbohydrate intake initially.

DIABETES

This is a disease resulting from too much sugar in blood. The hormone insulin secreted by the pancreas promotes the utilisation of glucose by the tissues. The normal blood glucose of 60 – 100ml is exceeded.

Causes of diabetes mellitus

- When the pancreas is diseased and therefore unable to secrete the hormone.
- When the pancreas id diseased is removed.
- When the cells that produce the hormone lack stimulation.
- Heredity-it may happen to those breed-relatives of the victim.

- Age-its common among people of over 40 years of age due to reduced activity and consumption of much carbohydrates but many people get it after the age of 50 and the highest incidences occur between 60 – 70 years.
- Women who give birth to heavy babies of about 4 kilograms and more are more likely to become
- Stress aim any serious infection may later form a disease.
- Diabetes is resumed to be present at birth but may be detected after many years. There are two categories of diabetes mellitus in patients;

KWASHIOKOR

If an individual experiences a deficiency of proteins while getting foods which lack proteins, the body suffers from a condition known as kwashiorkor.

Children who are weaned on carbohydrates deficient in proteins suffer from kwashiorkor. Such carbohydrates include Cassava, potatoes, yams e.t.cThe most likely group to suffer from kwashiorkor are young children aged one to five years.

Appearance and symptoms of Kwashiorkor

- The hair becomes thin and scanty and changes colour to brown.
- Arms and legs becomes swollen with cedema due to water retention.
- Swollen abdomen.
- The face is swollen with sunken eyes, the face is round with appearance of the moon face.
- The child is restless and inactive.
- The child lacks appetite i.e. uninterested in eating.
- The child is unhappy with frequent offensive diarrhoea.
- The general appearance of the skin is very light and shiny due to amount of fluids in the sub-cutaneous tissue.
- Dull and slow to think.
- The ability to resist infection is poor because the body has not necessary antibodies to fight diseases.

Prevention

- Feed the child on plenty of protein rich foods.
- The child's stool should be examined in the hospital often to check for worms. Worms are known to cause malnutrition by depriving the child digested food.
- Children should be shown love and concern by parents and other people with whom the child interacts, miserable children are likely to lose appetite for food hence leading to malnutrition.
- Food taboos and other nutritional undesirable food habitat that prompt children from eating foods rich in proteins should be discouraged e.g. the head of a family may be a vegetarian.

MARASMUS

It is a disease caused by lack of food especially those contains proteins and carbohydrates. A person suffering from marasmus is really a starved person. It can also be caused by prolonged breast feeding without giving supplementary foods containing carbohydrates and other nutrients as the child grows.

Supplementary feeding should be started between four and six months and should be continued with breast feeding. Worms and unsanitary conditions that can lead to disruption in the digestive system often causes Marasmus especially if such conditions persist.

Other types of Marasmus are caused by chronic illness such as Tuberchrosis, cancer and AIDs.

Appearance and symptoms of Marasmus

- Wrinkled skin but texture remains normal.
- Small face with wrinkled look of an old person and big eyes that are alert.
- No change the hair remains natural.
- Arms and legs become very thin with wrinkled folding skin.
- The abdomen is very small and wrinkled.
- The child is alert and interested in what is going around him.
- Growth retardation such that a child appears small for his age.
- The child has appetite and will eat if he finds food.
- The child's mental alertness acts normally.
- Wasting underweight and stunted.
- Ability to resist infection is not as badly affected as a kwashiorkor case.
- Anaemia is usually present due to lack of proteins and other nutrients.

Prevention

Adequate amounts of food mainly rich in both carbohydrates and proteins should be provided plus other nutrients. Severe cases of marasmus should be taken to hospital for proper diagnosis and treatment.

CONVINIENCE FOODS

These are foods that have been processed in such a way that they are either ready to eat or require minimum preparation. Clever use of convenience foods can give variety in the minimum of time, but where there is a choice, it's better to eat wholesome natural foods as for them will supply the body with maximum amounts of nutrients.

Increase in the use of convenience foods in Uganda today

The trend of the foods used in Uganda and in the world as a whole today has dramatically changed and home makerspeople at least once in a while prepare their dishes using convenience foods. This is a result of some of the following factors;

- Improvement in food science and technology in Uganda and worldwide
- Many people are working away from their homes.
- Reduced household labor force
- Less time available for preparation of food
- Increased advertisement in the food industry
- Population growth as natural foods may not be enough.
- Urbanization and industrialization
- Increased importation of foreign foods

Types of convenience foods

Dehydrated foods like custard powder, corn flour, breakfast cereals, etc

Ready to eat foods / fast foods like chips, fried chicken, cakes, samosas etc

Canned / tinned foods like canned tomatoes, tinned beans, tinned fish and meat

Frozen foods such as ice cream, pastries, frozen pies etc

Ready prepared such as cake mixes, instant coffee and yeast.

Merits of using convenience foods in cookery

- Its time and labor saving
- There is no wastage as the whole food is used
- It's easy to use especially with beginner cooks, elderly and handicapped.
- It's useful in cases of emergency like when you have a faulty appliance or limited time.
- It requires less fuel for cooking.
- It's easy to store with a long shelf life.
- It provides a wide range of both foreign and natural foods out of season.
- Convenience foods are well packed in a hygienic way.
- They are easy to transport and pack since are light.

Demerits of convenience foods

- Convenience foods have a poor flavor to that of natural foods.
- They are more expensive than fresh foods.
- They have reduced amount of minerals and vitamins.
- They make a house wife lazy and with no chance to develop her food preparation skills when over used.
- Do not satisfy large needs especially a small pack.
- Some instructions may not be clear to the user ending up with poor products.

LEFT OVERS / REHEATED/ RECHAUFFE COOKERY

This is the art of using the leftover food to prepare more interesting and nice dishes. The reheating of leftover food is called *rechauffe cookery.*

Basic rules for handling left over foods

- Left over foods must be used within 24 hours.
- Cool left over foods as quickly as possible.
- Reheat food as quickly as possible.

- Cut up the left over foods finely or mince it to speed up heat penetration.
- Leftover food should not be overcooked as this toughens the proteins and make them not easily digested.
- Cook the additional ingredients before adding them to food.
- Never reheat the leftover food more than once.
- Add spices and flavors or seasonings to improve on the taste and flavor of the leftover food.
- Serve leftover food immediately after preparation.
- Coat the food before reheating.

*Suitable methods of cooking are **frying** and **baking**.*

Suggested dishes from different left over foods

Fish; fish pie, fish cakes, fish in sauce and fish pasties

Meat; meat pies, meat samosas, shepherd's pie, beef burgers, beef curry, meat loaf, croquettes

Bread; bread sauce, bread and butter pudding, queen of pudding

Vegetables; shepherd's pie, vegetable samosas,

Beans; omugoyo, bean relish, bean samosas, beans soup

Potatoes; potatoes chips, potatoes scones, shepherd's pie, potatoes cakes

Rice; rice balls, rice samosas

PACKED MEALS

These are meals to be eaten away from home. Planning packed meals is part of everyday use for many people. Foods for packing should be convenient, unspoilt by carriage to the destination and easy to eat.

Occasions on which meals are packed include; *picnics, outings, working class, school going children, visitation days for schools and when visiting a patient.*

Important points to consider when planning and preparing packed meals

The packed meal should be well balanced with good supply of all the required body nutrients.

- Foods chosen for packing must suit the person like an office work needs a light lunch.
- The foods prepared must keep well for some time.
- The foods must be suitable for the occasion like picnic, lunch or snack.

- Include foods easy to pack especially that which do not spill over.
- Pack just enough food for the meal to avoid wastage.
- The foods must be easy to eat with minimum use of utensils and cutlery.
- Consider the means of transport to be used like public or private means.
- Take fruits as a whole but not when cut in pieces.
- The dishes used for packing must be lined with foil papers or grease proof paper.

Suitable materials for packing

- Vacuum flasks for both hot and cold drinks
- Banana leaves after subjecting them to heat.
- Plastic containers well lined with grease proof paper or foil papers.
- A Tiffin carrier
- Biscuit tins or paper boxes.
- Cellophane bag
- Paper bags
- Foil papers and grease proof papers

Suitable foods for packing

- Baked foods like biscuits, bread, cakes.
- Roasted foods like meat, fish and chicken.
- Meat pies, meat loaf, sandwiches, whole fruits and vegetables

FOOD PROCESSING, FOOD CONTAMINATION AND PRESERVATION

Food contamination is when food becomes unsafe for human consumption due to harmful substances in it. Food contamination is mainly of two ways i.e. Food spoilage and food poisoning.

Food spoilage

This occurs when there is a change in natural state of food making it not good for human consumption for example, rancid butter and soured milk. A change could be in texture, nutritive value, flavor and colour.

Food poisoning

Is an illness that results due to the injection of harmful food. It can be caused by harmful chemicals and micro-organisms in food. Food poisoning is not easy to detect because the presence and effects of micro-organisms and chemicals do not usually change the physical characteristics of food.

Types of food poisoning

- Bacterial food poisoning caused by moulds, salmonella, clostridium, staphylococci among others.
- Chemical food poisoning caused by weed killers and insecticides.
- Metallic food poisoning caused by metals present in food like lead.
- Biological food poisoning caused poisonous substances naturally found in food like in Poisonous mushroom, green potatoes some yams and cassava.

Bacterial food contamination

This occurs when food is attacked by harmful **bacteria like staphylococci, bacillus cereus and botulinum etc.**

Bacillus cereus: This is contained in dust, soil and water. It is associated with abdominal pain, vomiting and diarrhoea. It is common in foods like rice, maize flour and other cereals. The sign and symptoms can be seen within 6 and 24 hours.

Staphylococcus: This is mainly found on the skin, nose, throat and boils. It is normally common in raw meat and goat's milk. The signs and symptoms are; abdominal pain, Diarrhoea, vomiting.The micro-organisms take 6 to 24 hours to mature.

Salmonella: It is found in the intestines of humans and other animals including cats. It is common in eggs, ice cream and always associated with fever, headache, abdominal pain, Diarrhoea and vomiting. The signs and symptoms can be seen between 1 – 8 days.

Botulinum: This is also common in intestines of humans and animals. It's also common in soils and flies. It is always found in meat dishes prepared in advance. It is associated with double vision, diarrhoea and paralysis.

The signs and symptoms are noticed between 1 – 8 hours.

Causes of food spoilage / Contamination

Evaporation / Condensation

This also leads to spoilage as seen when food lose water vapor as noticed in cakes, bread, fish which results into staling. This can be prevented through using appropriate wrapping paper like cling on foil, grease proof paper, air tight containers as well as ventilated and humidified environment.

Condensation

This leads to food spoilage in a way that water condenses on to the food which favors the growth of micro- organisms. This can be controlled in the same way as evaporation.

Enzymes

Enzymatic reaction in food bring about food spoilage by causing browning of peeled potatoes, loss of Vitamin C, ripening and changes in the flavor of fruits and rancidity of fats and oils.

Prevention of enzyme activity in food

- By application of heat like blanching tomatoes.
- Removal of oxygen / cutting off oxygen supply.
- Proper cooking of green vegetables.
- Proper storage of fats and oils.

Micro - organisms

These include bacteria, moulds and yeasts. Micro-organisms do well in a warm environment, at 30 – 70 ^{0}C, 140 -340 ^{0}C are inactive and killed above 100 ^{0}C.

Prevention

- Avoid warm moist conditions
- Keep yourself clean and the kitchen
- Control the spread of germs if detected

Chemicals

These are sometimes added to food intentionally or when not intended. These may include, weed killers, pesticides and insecticides.

FOOD PRESERVATION

These are processes which aim at keeping food safe for human consumption for a long period of time / increase on shelf life of food.

Principles of food preservation.

Heat treatment: Heat is applied to food to kill / destroy micro-organisms like pasteurization of milk, sterilization of milk and juices, smoking and bottling.

Removal of moisture. Moisture is removed from food since it is one of the conditions necessary for survival of micro-organisms. For example drying of fruits and vegetables.

Reduction of Air / cutting of Air supply. This is done to remove / reduce oxygen gas which supports life for micro-organisms.

Chemicals. When chemicals are added to food (salt, sugar, vinegar) they draw water out of the micro-organisms, creating unfavorable environment for enzyme activity.

Reasons for preserving food

- It saves on wastage.
- A variety of food is produced.

- Food is available out of season.
- Increases on shelf life of food.

Methods of food preservation

There are a variety of methods used in food preservation and these include; Dehydration / Drying, Heat treatment, use of chemicals, refrigeration and freezing. Food is preserved using one or more principles.

Dehydration

This is the removal of water from food and this prevents the growth of bacteria because they need high water concentration to grow. Dehydration can be carried out under the sun, in an oven, drying cabinet, spray drying, roller drying, accelerated freeze drying and puff drying.

Suitable foods include fruits, herbs, fish, potatoes, cassava, bananas, pulses and cereals.

Heat treatment

This works on the principle that micro-organisms are killed and enzymes inactivated and denatured at high temperatures. This is used pasteurization of milk, sterilization of milk and fruit juices, ultra – heat treatment, smoking, bottling and canning.

Freezing / refrigeration

This inactivates the action of enzymes and prevents the growth and multiplication of micro-organisms.

The same principle of freezing also applies to Refrigeration. The only deference is that in refrigeration the temperatures are above 0 ^{0}C than in freezing where they are kept in minus degrees. Below 0^{0}C.

Freezers and refrigerators operates on the principle that when a gas (liquid) evaporates. It results into cooling effects.

Foods are suitable for freezing are, baked goods and non-baked ones like cakes, poultry, Ice cream butter, meat, lamb and fish.

Rules of deep freezing

- Deep freeze fresh food only
- Preparation procedures should be hygienic.
- Foods should be packed sealed and labeled
- Do not put warm or hot food in a freezes
- Freeze food as quickly as possible to retain texture
- Freeze food in small packs only as big packs takes long to freeze and thaw
- Avoid over packing food closely together as it slows down the freezing process
- To reduce running a costs switch off the fast freeze control as soon as food is froozen.

- Always keep the door of the freezer tightly closed to avoid warm air from entering
- Defrost the freezes regularly
- Do not store food longer than the recommended time

Addition of chemicals

Chemicals work on the principle of drawing water out of the micro-organisms and creating unfavorable environment for micro-organisms and enzymes due to an increased or reduced PH. The chemicals commonly used in preservation of food are sugar, vinegar (Acetic acid), salt, benzoic acid and alcohol.

Irradiation

This is a short term method of food preservation involving use of irradiations to kill micro-organisms in food. When food is irradiated energy passes through it and kills harmful bacteria. In most cases irradiation has no effect on enzymes in food, so the food will always deteriorate.

Canning / bottling

Here food is put into cans or bottles, sealed and subjected to very high temperatures which kill micro-organisms. During canning / bottling you have to make sure that the cans are very clean, not dented or blown as they may contain harmful bacteria. The high temperatures used will always affect the vitamin C and B vitamins in food.

Pickling

This chemical method of preserving food by placing it in a solution of spiced vinegar. During pickling high standards of hygiene must be maintained and foods used must be fresh. Suitable foods include, ripe bananas, mangoes, pineapples, vegetables etc. The principle behind this is that the acidic conditions of the solutions are un favorable for the growth of micro-organisms.

Curing

This is a chemical method of preserving food by soaking it in a solution of Brine (a solution of salt and water). This makes water in food to be driven out and the conditions are also unfavorable for the growth of micro-organisms. Suitable foods include Bacon and harm.

JAM AND JELLY MAKING

These are ways of preserving fruits where they are changed into other forms to avoid on wastage and other domestic uses. This makes them available when out of season.

Jam is a preserved product made from whole fruits, cut into pieces or crushed and heated with water and sugar to activate pectin in the fruit. It contains both fruit juice and pieces of the fruit / vegetable flesh.

Jam making depends on the type of fruit to be used and the pectin it contains in addition to the sugar concentration and acid. The setting of jam depends on a gum like substance called pectin.

Jelly is a clear semi sold preserved food substance with a resilient consistency made by setting of liquid containing pectin boiled with sugar.

Choice of fruits for jam making

- Use a mixture of under ripe fruits and ripe fruits. Under ripe fruits contain more pectin and which help in the setting of jam.
- The fruits must be fresh with no damages
- The fruits must not have bruises or signs of mould growth.
- The fruits should be clean and firm

Testing for pectin in fruits

Boil a little of the fruits to be tested in small quantity of water until softened and cool. Put 1 tbs of the fruit juice into a bowl, add 3 tbs of methylated spirit, stir and leave for 1 minute.

Results

A single firm clot. Fruit is rich in pectin.

A soft clot of 2 to 3 firm clots. Average pectin in a fruit.

Many small pieces of jelly. Poor amount of pectin in a fruit.

Testing for the setting of jam

Cold plate test

Put 1 tbs of jam on a cold plate and leave aside. When the setting point has been reached, the surface of the jam will wrinkle when pushed with a finger.

Temperature test

Use a warmed sugar thermometer when boiling jam. It will register 140 ^{0}C / 220 ^{0}F when the correct sugar concentration was used for example; the setting point has been set.

Flake test

Take a spoonful of jam. If it falls from the edge of a clean wooden spoon in a broad flake, instead of continuous stream, then the jam is set.

Weight test

Weigh empty jam pan. If 60 percent sugar is used, every 2.4 kg of sugar should give 4 kg.

Final weight: quantity of sugar x 10 / 6 = yield of jam + weight of the jam and spoon.

The keeping qualities of jam are affected by:

- Proportion of sugar
- Amount of boiling
- Exclusion of air
- Moisture in covering and storing it

Good quality jam is clear and bright, has the flavor of the fruit and set without being stiff.

Faults in jam making

Mould growth

Storing jam in a warm and damp place

Air between waxed disc and jam

Jam insufficiently filled

Use of inferior fruit

Too little sugar

Insufficient cooking

Fermentation

Too little sugar

Not enough boiling

Crystallization of sugar

Too much sugar

Too little acid

Cooking for a short time to invert sugar to simple sugars

Cooking too long which results in a lot of evaporation

Jam not set

Too little acid or pectin

Under cooking

Fruit too hard

Not cooked enough before adding sugar

MARMALADE, CHUTNEY AND PICKLES

The term **marmalade** means a clear jelly like preserve made from pulp and rinds of citrus fruits. It is used as bread and sandwiches. Many jam and jelly recipes call for pectin to be added but it is not needed for maramalade because of the high amounts of pectin already present in the fruits.

A pickle means a preserve made of fruits / vegetables when immersed in a solution of spiced vinegar like salt, spices and sugar are mixed with vinegar.

Chutney is a pungent relish made of fruits, herbs and spices for example sugar and spices and vinegar. It should have a thick firm consistency, good color and flavour. It's often refered to as a *sweet pickle*. It can accompany curried dishes and it's a good spread.

STOCK, SAUCES AND SOUPS

Stock is a liquid into which the flavor soluble nutrients of food have passed during cooking or simmering gently for a long time). Bones, lean meat, root vegetables and seasonings are usually used to make stock and the basic principle is to extract the maximum amount of flavoring and nutrients from them. The extraction depends on the solvent action of water and prolonged slow cooking. The nutritive value of stock varies according to the ingredients used.

The basis of soups and sauce is good stock which gives it a rich flavor, adds flavor, value, taste and apperance.

Essential points for a good stock

- Cleanliness and freshness of all ingredients
- Small division of meat and removal of fat
- A balanced proportion of ingredient. *None of the vegetable flavor should dominate. Strong flavored vegetables like turnip should not be used*
- Carefully added seasoning. No one spice or herb should dominate the flavor
- Cook meat for longer period than the vegetables
- Remove white scum and fat from the surface
- A strong pan with a well fitting lid should be used
- Make and leave stock in the pan overnight, wash the pan thoroughly

Suitable foods are: *Meat and bones: Scraps and gristles, Liquid in which fowl / meat has been cooked (not salted meat)***,** *Vegetable and vegetable liquid (not from green vegetables)*

Unsuitable foods are: *Potatoes, bread, barley. Thickened gravy would make the stock sour***,** *Green vegetables and liquid in which they were cooked*and *Salty liquid from bacon..*

Types of stock

Basic stock: Made from fresh, bones, fish, vegetables

House hold stock: Cheaper ingredients are used. Liquids from meat, trimmed scraps, meat scraps or vegetables.

White stock. Veal and bones are used.

Fish stock. Made from fish trimmings which sour if cooked longer more than 30 min.

Stock cubes are concentrated dried stock containing meat extractives and flavors and may be used when stock is not available. They include, beef stock cubes chicken stock cubes

SOUPS

Soups are diluted forms of food which mainly supply body building and energy materials to the body.

Importance of soups in the diet

- They stimulate appetite due to their strong flavor.
- It is a hot starter to the meal in cold weather.
- It is used in invalid cooking to stimulate the appetite.

Classification of soups.

- Thin soups
- Thick soups
- Consumes (clarified) soups
- Bowllions soups
- Purees
- Broth

THIN SOUPS

Clear soups. These are made from meat stock with a little vegetable for flavor. They are served as stimulant of digestion and have varied nutritive value.

Broths: *These are made from vegetables / meat with the addition of cereals like barley or rice. They have a high nutritive value because of the presence of the vegetables and cereals which provide starch and some vegetablesprotein.*

THICK SOUPS.

Purees

These are made from vegetables which include; the cooked vegetables liquidized / sieved which helps to thicken the soup. A liaison or thickening flavor like soya flour may be used to give a smooth texture and bind the ingredients together. Other types of liaisons are a roux of batter and floor or York of an egg or cream. The nutritive value depends on the ingredient used like carrots, peas, mushroom, potatoes soups.

Liasons

These are the binding / thickening agents used in soups to hold the ingredients in suspension or give thickened consistency. They include starch, roux, egg York and cream.

Dietetic value

Soups have an important role to play in the diet .It stimulates the appetite, encourages secretion of digestive juices and introduce variety and warmth in the diet. Broths are given to invalids and convalescents as a dilute and easily digested form of food.

Disadvantage of soups

When served before a meal, many soups, give a feeling of fullness, thus reducing the capacity to eat amore nourishing main course. This applies particularly to children, for this reason soups should only be served in small portions

Rules for making soups

- Use good quality fresh ingredients
- Use a well– made stock rather than water.
- The soup should taste of its main ingredient and ingredients should be carefully blended to give a good flavor.
- Season well using salt, paper, herbs and other flavoring.
- Skim the grease off it necessary by drawing kitchen paper over the surface of the soup.

Essentials of good soup

A well – made soup should have a good;

- Good flavor
- Colour
- Texture and consistency
- Taste

Points to consider when serving soups

- Quantity 150ml per person
- Variety. Don't repeat the flavor of the soup later in the meal
- The season of the year. Serve thick soups in winter and cold soups in summer
- Colour scheme of the meal
- Correct accompaniment like croutons with purees

- Garnishes; chopped parsley, grated cheese. Accompaniment, Dinner rolls, brown / white bread, toast, croutons

SAUCES

A sauce is a liquid food usually flavored and thickened. It's used to accompany dry foods like roasts. Although meat sauces are smooth, some have ingredients which are sieved and therefore provide texture, for example curry sauce and apple sauce.

Qualities of a good sauce

- It should improve food by adding flavour.
- It should be with the correct consistency.
- Should be well seasoned and flavoured.
- Should be smooth and glossy except in the cases of textured sauces.
- It should either be piping hot or very hot.

Uses of sauces

- It may be part of the dish like beef stew or braised dishes
- Used to coat dishes like augrutin
- May be used to bind food like rissottles
- May be served with food as an accompaniment

The nutritive value of a sauce will depend on the ingredients used like inclusion of milk, cheese andeggs.

Dietetic value

- It improves and enhances flavour
- Provide a contrasting colour and flavour
- Bind the ingredients together
- It's a coating agent
- Contributes to the nutritive value of the food
- Provides moisture
- Reduce on the richness of some foods
- Add interest and variety to a meal

Classification of sauces

Simple sauces

Simple or blended sauces use corn flour or custard powder infused, jam and syrup sauces are thickened with corn flour or purees made from apples and tomatoes.

Roux sauces

A roux is a coating sauce.

Egg based sauces

These include hollandaise, custard and mayonnaise.

Cold sauces

Cold sauces and dressings include mint sauce, horseradish sauce, french and other dressings.

Batter sauces

They include all types of batters

Dehydrated sauces

These are made from dried powdered ingredients like vegetables, skimmed milk, fat emulsifiers, thickeners and additives.

Alternatively, soups are classified basing on their appearance like brown and white sauces.

Faults in sauce making

1. Lumpy sauce

a) Roux type

- Fat too hot when flour is added
- Roux not well cooked
- Poor stirring when adding the liquid
- Insufficient stirring during cooking

b) Blended type

- Insufficient blending of corn flour and cold liquid

2. Raw flavour

- Insufficient cooking of roux
- Sauces not cook long enough

3. Lack of gloss

- Insufficient cooking

Thin sauce

- Wrong proportions used
- Over cooking of the roux causing breakdown of starch to dextrin which is insoluble
- Under cooking

Thick sauce

- Wrong proportions used

Greasy sauce

- Too much fat
- Over cooking the roux causing separation of the fat

Poor colour

- Over heating a white sauce
- In brown sauces, uneven cooking of the roux will cause brown specks

CONSUMER EDUCATION

Economy in the kitchen

Budgeting

Of all the expenses, food is the most essential. A balanced diet is necessary for good health which in turn is important if the earnings of the family or individual are to remain stable.

Guidelines for budgeting for food

- Plan the weekly shopping before going out and stick to the plan as far as possible.
- Look for competitive prices, special offers and multi buy savings.
- Buy only the amounts required for particular meals, unless the extra food is to be used upon another occasion.
- Compare prices per unit weight, volume, portion or pack to get the best value.
- Check supplies of food in stock
- Buy from clean, hygienic and well ventilated shops.
- Substitute less expensive commodities where possible.

FOOD SELECTION AND SHOPPING

Planning for a shopping trip involves making a shopping list, considering the budget, market research, assessing the genuineness of advertising, understanding the factors that determine the wholesomeness and safety of food.

Shopping

This involves making a wise use of information to get the food you want. A good shopping plan ensures that foods that are chosen are of high quality and worth the amount of money that they cost.

Before shopping the following points must be considered.

- Make an inventory of what is in the food store or not.
- Make accurate shopping lists and plan meals in advance.
- Buy from hygienic and well ventilated shopping outlets.
- Check the food being purchased for indicators of good quality products like unit price, expiry date and nutritional facts.
- Buy the best quality you can afford for example make comparisons of prices of similar products in different shopping outlets.
- Choose food from reliable and reputable manufacturers.
- Study and properly interpret the consumer information on the label.
- Whenever possible buy the dry ingredients like powdered milk, flour, sugar in bulk to reduce on shopping trips and expenses.

Examples of shopping outlets include; General stores**,** specialized shops**,** Super markets**,** Self service shops**,** online shopping**,** Factories**,** Vendors and hawkers.

BULK BUYING

Many people buy in bulk once a month or a week. In order to be able to buy in bulk, the following must be available:

- Sufficient storage space in the home for food
- The initial outlay of money
- Transport to and from the shop

WHERE TO SHOP

Super markets

Advantages

- Has a wide variety of foods
- Food is always of good quality and fresh
- Prices are generally cheaper
- Food is selected by the consumer

- Car parking is usually easy and convenient
- The standard of hygiene is high
- Usual food may be stocked
- Multi buy and special offers can save money
- Many have convenient places like toilets and information leaflets.

Disadvantages

- Do not usually deliver food to homes
- It may be difficult to get advice
- Self service may result into over spending
- Long queues at the check outs which can increase on the shopping time
- It may difficult to buy small quantities and packs for single pack.

Small independent groceries

Advantages

- The personalized service is helpful to the customer
- The shop may deliver the goods
- It's convenient as it's always near the residential areas.
- Small packs may be available.

Disadvantages

- May be expensive
- There may be a limited selection
- Food may not be very fresh

Specialized shops

Advantages

- The advice on the food being bought is always good
- Food is usually of good quality
- The selection of food within the range is normally good.

Disadvantages

- Food may be expensive

- Food may not be fresh

Open markets

Advantages

May be considerably cheaper

There is normally rapid turnover of food, so food is fresh.

Local producers are often available

Friendly services are always given.

Disadvantages

- Food sold may be of inferior quality to that on display
- The hygiene may be of poor standards
- Some foods may not be very fresh

FOOD PACKAGING AND BRANDING

This is the last stage of food processing where food is put into packs before it's delivered to the consumers. Food manufacturers have to package food with great care because packaging food plays the following;

- Packaging food keeps it safe and prevents damages.
- It keeps the product clean and from any contamination.
- Packaging attracts customers to the product.
- It conveys the information required by food labeling regulations

Qualities of a good packaging material

- Be non toxic
- Provide sanitary protection
- Resist normal bumping that occurs in super markets
- Open easily
- Reseal or pour well
- Attractive
- Relatively inexpensive
- Have food labels

NURTIONAL FOOD LABELS

Food labels help consumers make health food choices because they contain information such as *nutritional content, list of additives and ingredients, date of manufacture and expiry and bar codes.*

Qualities of a good nutritional label

- Name of the product including any treatment food has undergone.
- A list of all the ingredients contained in order of their proportions by weight
- The weight of food excluding the packaging (net weight)
- Shelf life of food / expiry date
- Name and address of the manufacturer
- The origin of the food

Nutritional information

This provides information on the nutritional value of food. It's sometimes not important to look for actual nutritional content in terms of low, reduced or light as it may be misleading. A good food should contain at least one sixth of the major nutrient.

Bar coding or universal product code (UPC)

Many manufacturers and shopping outlets use computerized codes that help in the identification of products. The information includes things like price, brand, expiry dates among others. A scanner at the check points can then be used to interpret the information on the bar codes.

Food additives

These are substances added to foods in small quantities while it's being prepared for sell to improve on its quality. Examples of the common food additives are *preservatives, antioxidants, acids, bleaching agents, colours and improvers.*

Reasons for using food additives

- Prevent food spoilage and maintain freshness for example the preservatives and anti oxidants used.
- Additives help in processing or preparing of foods like acids and bleaching agents.
- They improve on the keeping quality of the food.
- Help to bring about variety in food products like snacks of different colors and shapes.
- Additives maintain and improve the nutritional value of food.
- Additives are used for miscellaneous purposes like dough improvers, glazing agents and acids.